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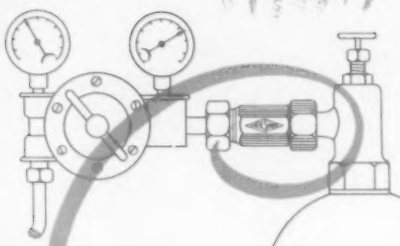

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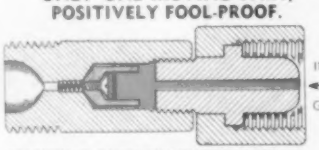

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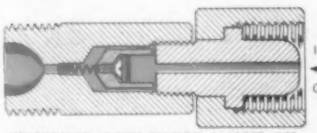

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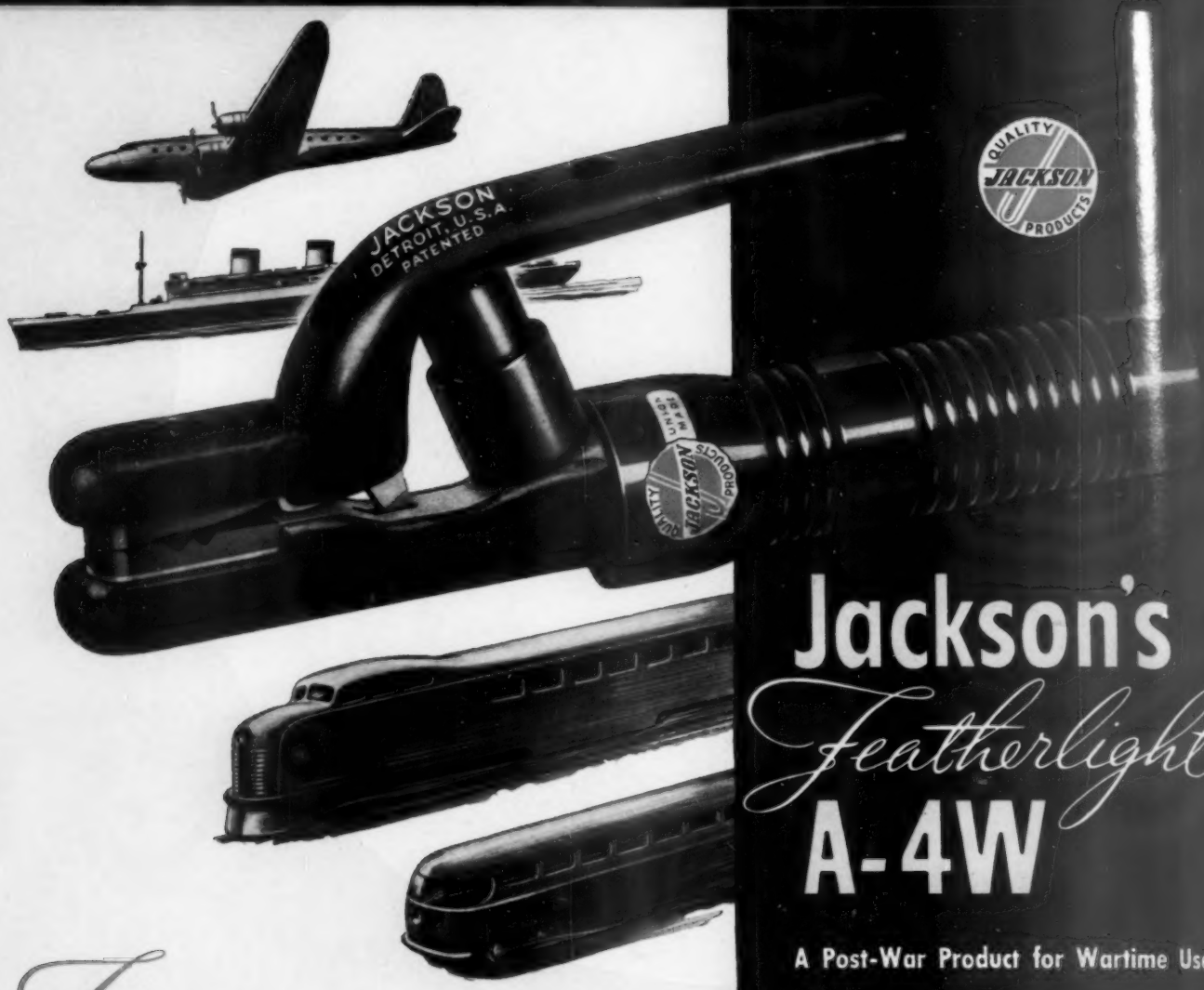

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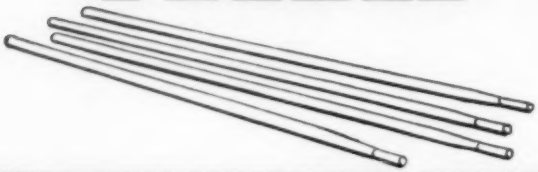
McKAY *Stainless Steel* ELECTRODES



McKAY GRADE	A.I.S.I. TYPE No.	USE AND CHARACTERISTICS	SIZES
18-8	308	For welding Stainless Steels from 17 Chrome, 7 Nickel to 20 Chrome, 10 Nickel. Weld metal will be equal or superior to parent metal in corrosion and physical properties.*	1/16"—5/64"—3/32" 1/8" —5/32"—3/16" 1/4"
25-12	309	For welding type No. 309 Stainless Steel and stain clad plate where higher Chrome Nickel content is desired than can be secured with 18-8 Electrodes.*	1/16"—5/64"—3/32" 1/8" —5/32"—3/16" 1/4"
25-12 Cb	309 Cb	For welding type 309 Cb Stainless Steel and for multiple pass weld where interpass temperature may be up long enough for carbides to form.*	1/16"—5/64"—3/32" 1/8" —5/32"—3/16" 1/4"
25-20	310	For welding type 310 Stainless Steel. Also widely used for welding plain Carbon Steel up to .50 Carbon and low Chrome Steels where post heat treatment is not practical.*	1/16"—5/64"—3/32" 1/8" —5/32"—3/16" 1/4"
18-8 Mo	316	For welding type 316 Stainless Steels. Molybdenum content of weld deposit 2 to 3%.	1/16"—5/64"—3/32" 1/8" —5/32"—3/16" 1/4"
18-8 Mo	317	For welding type 316 or 317 Stainless Steels. Molybdenum content of weld deposit 3 to 4%.	1/16"—5/64"—3/32" 1/8" —5/32"—3/16" 1/4"
15-35	330	For use on type 330 Stainless Steels where welds are subject to extremely corrosive agents or require heat resistance up to 2100°F.*	3/32"—1/8" —5/32" 3/16"
18-8 Cb	347	For welding type 347 and 321 Stainless Steels where welds may be exposed to service temperatures between 900°-1500°F.*	1/16"—5/64"—3/32" 1/8" —5/32"—3/16" 1/4"
12 Cr	410	For welding type 410 Chromium Steels. Weld structure is martensitic requiring preheat and post heat treatment to refine grain structure.*	3/32"—1/8" —5/32" 3/16"
16 Cr	430	For welding type 430 Chromium Steels. Weld structure is normally ferretic. Preheat and post heat treatment required to eliminate stresses.*	3/32"—1/8" —5/32" 3/16"
18 Cr	442	For welding type 442 Chromium Steels. Weld structure is ferretic and subject to grain growth. Preheat and post heat treatment required to eliminate stresses.*	3/32"—1/8" —5/32" 3/16"
28 Cr	446	For welding type 446 Chromium Steels. Weld structure is ferretic and subject to grain growth. Preheat and post heat treatment required to eliminate stresses.*	3/32"—1/8" —5/32" 3/16"
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They Need a Helping Hand!

The war is not yet over, but the veterans are already coming home. The war *is* over for the 10,000 to 12,000 ex-soldiers, sailors and marines who are returning home each month with medical discharges. Some of these veterans are physically handicapped; others are suffering from the effects of disease or war neurosis. We must provide a helping hand—not charity—but simply assistance and understanding in helping them to return to normal civilian life.

After hospitalization and rehabilitation training, most veterans are physically ready to return to industry. By far the great majority of them have the pride of decent, self-respecting men; they don't want to become objects of charity because of their disabilities. We must respect that pride. Like you and I, all they are asking out of civilian life is a chance to work and earn their way. We've got to give it to them.

Employment for returning veterans must be forthcoming without long and discouraging waiting. All branches of industry can and must help to make it possible for discharged veterans to assume their rightful places in production lines. That includes the branches who use welding.

Fortunately, it can be done. Industry has learned that even a severely physically handicapped individual is capable of doing a useful job. This is because no single job ever requires all the physical capabilities that a human being possesses. Since the worker will only be using a part of his abilities under any circumstances, it is simply a matter of "matching" the handicapped worker to the jobs that require the motions and operations he can still perform.

Care must be exercised. The physically disabled must not be placed in surroundings that will aggravate or bring about a relapse of their war-acquired ailments. Those charged with the placement of discharged veterans must have imagination and forethought—and give careful consideration to each veteran as an individual.

There are many examples of the capabilities of disabled veterans in the welding field. One veteran, for instance, lost an eye in Sicily; he has returned to his former job of maintaining welding and cutting torches, tips and regulators without loss of efficiency. A Marine downed at Guadalcanal by a Jap dum-dum bullet in the back is working as a weldor's helper in a cement mill maintenance crew. A premature turret explosion took away a sailor's hearing, but a hearing aid makes it possible for him to be as good a weldor and craftsman as he ever was. And there are many fighting men who have lost a leg or an arm who are holding their own as weldors in our shipyards and war plants.

Part of the present acceptance of the disabled veteran is doubtless due to the manpower shortage. Even though the manpower picture changes drastically during reconversion, rehabilitated veterans must be given the opportunity of employment. They must be treated exactly on a par with other workers.

A word should be added about the men discharged from the services "for nervous or mental reasons." Most of them were perfectly good workers and sound citizens before induction—like swimmers whose ability in the water is sufficient for a calm day but not for a heavy storm. Because they couldn't take the full rigors of army life is no reason why they cannot resume civilian employment. Let's stop calling them "psycho-neurotics"—the label is unfair and misleading in the majority of instances.

The welding industry has a definite responsibility toward those men who laid down the welding torch and electrode holder to take up the rifle and hand grenade. Let's all help to make veteran weldors of our welding veterans by lending a helping hand.

So Now Brownie Is Happy With A.C.

I HEARD a stricken moan and looked over at Brownie, my boss. He's our Purchasing Agent and so has a right to look unhappy—decent supplies being as scarce nowadays as prospective husbands. But I never did see him look this sunk before.

"Miss Jones," he groaned, meaning me, "I got troubles. For years our Welding Department has done a swell job with D.C. equipment and Murex electrodes. You know: FHP for downhand work, Fillex for fast fillet welding, Genex for tacking and fitup, Type M or Type 90 for high tensile steels, and so on. Now the department's installing some A.C. units, and I have to try to locate and stock a whole new group of electrodes. I feel like sticking my head in an eight-ton drop hammer and Ending It All."

"You'll do better," I said, "to stick your head in the Welding Department and ask for Joe, the foreman. And I'm going with you, to see you two don't come to blows about this."

But Joe, who's the excitable kind himself, just sort of tut-tutted poor Brownie's worries.

"Mr. Brown," Joe said, grinning, "every pound of Murex we have in stock works on both D.C. *and* A.C., including the Stainless. In fact, one of our A.C. units is already running, and going along swell on Murex."

Brownie practically collapsed on the nearest chair, he was that relieved. I felt the same way, knowing what troubles Joe's knowledge of Murex had saved me.

"And while you're here," Joe smiled, "you might take a request. Stock me some Murex Type A for vertical and overhead work on A.C., and some of their Alternex, which also does an extra-swell job on A. C. Meanwhile, forget your worries. Except for their type E6012 and E7012, practically all regular Murex electrodes work as well on alternating current as on direct."

P.S. Miss Jones back again. I found out later how Joe happened to know things about Murex my own boss didn't know. He has one of those big Murex wall charts, dividing their thirty-odd electrodes by use on mild steels, low alloys, stainless, and hard-surfacing. It also shows at a glance the AWS-ASTM grade, polarity, current, etc., of each electrode. I wrote for one for Brownie, and I think no Purchasing Agent in a plant that does welding should be without one. You just drop a line to:

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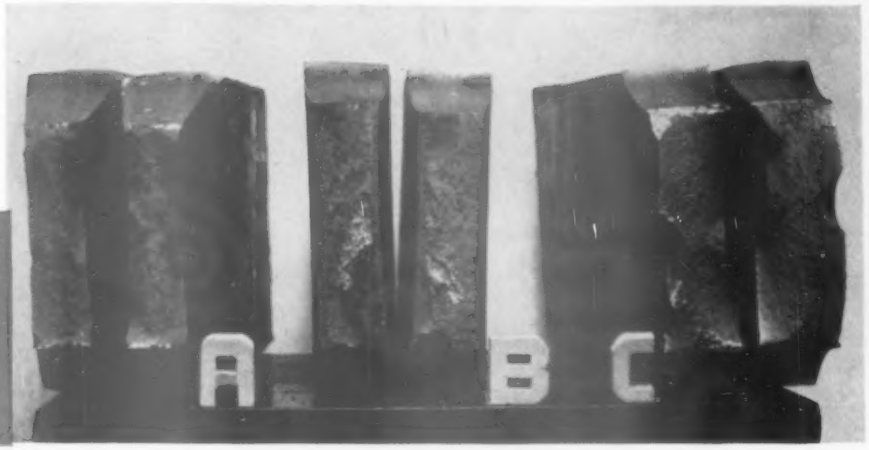


Fig. 1—Tensile test specimens. A—as welded; B—0.015 in. deep notch across both faces at the reduced section; C—same size and type of notch across both faces and edges. Details of tensile strengths and reductions of area are given in the accompanying text.

Failures in Steel Fabrication

Just as a doctor diagnoses the cause of an illness, so can a metallurgist diagnose the cause of failure of a steel structure. Failures leave telltale evidence such as grain structure, deformation, notch-effect nucleus, etc.

By **R. V. ANDERSON**

CONSTRUCTION steel in order to serve a useful purpose must be fabricated by flame-cutting, heating, bending, welding and other operations. The fabricated sections are often lifted by clips, eyes, pads, etc., attached for this purpose.

The failure of any part means danger of loss of life, property and/or time. Some types of failures and means for their correction have been described in trade publications and in various instruction manuals such as the Maritime Commission's "Welding Instructions." The percentage of failures has been small compared to the total tonnage involved, which is a tribute to the welding industry and to the men who have trained green help to do good work faster than ever before. This article was written in the hope that the small percentage of failures may also be eliminated.

Reasons for Failure

Failures have occurred in the completed structure, but there are other failures that occur in preassemblies or prefabrication. A study of such failures must extend over a matter of time and tonnage in order to obtain the overall picture. The studies described cover the fabrication of approximately 900,000 tons of steel. No failures have been recorded as due to the chemical or physical properties of the steel or to any inherent deficiency of the steel.

The failures observed in order of occurrence have been due to notch effects, welding sequence, shrinkage and fatigue. A small percentage has been due to work hardening and improper calculation of the stresses involved.

Some Typical Failures

Example 1: A ten ton lift was being made with a shackle capable of lifting 120 tons. Failure occurred in three places in the yoke of the shackle. The shackle had been battered and work hardened, and a weldor had welded his initials on it.

Example 2: A 30 ton lift was being made with four lifting pads, each of which was capable of supporting a load in tension of 50 tons. Failure occurred in three pads in sequence, due to bending of the pads which produced alternate compression and tension or an accelerated fatigue effect.

Example 3: A hatch coaming representing a lift of approximately six tons was lying on the ground and properly supported. At three a. m. a sudden drop in temperature caused the plate to fail, with a crack 18 ft long proceeding from a sharply notched corner. The failure was approximately 18 in. from any welding and the opening at the start of the failure was about six inches. The welding had all been done continuously toward the point at which the failure started.

Example 4: Four C-type clips had been used to anchor a 20 ton structure in position. Cables ran from the clips to the structure. Each clip was capable of withstanding a straight-pull load of 25 tons. Failure occurred in all clips in rapid sequence. The clips had been flame-cut with several large notches in the back side of the C. A duplicate clip was made, and stress was applied in a manner similar to those which had failed; this clip was found to fail under a three ton load.

Example 5: In attaching stiffeners to bulkheads, 300 feet of fillets were found to be cracked. The stiffeners had been dogged to the plate under considerable pressure. Where a clearance of 0.020 to 0.030 in. was left between the stiffener and the plate, no cracking could be obtained.

Example 6: A 5½ in. shaft on a bridge crane failed due to progressive fatigue starting from a square shoulder that should have been a radius fillet. The track was rough and the crane rode the shoulders of the rail, dropping the crane and load for a quarter inch at intervals.

Stress Calculations

Stresses may be calculated and safety factors added, but workmanship must always be a more or less uncertain factor. The stresses may be calculated for tension and compression, shear, torsion or for combined direct stress, bending and torsion. The point of applying the load may increase leverage. Notch effects may nullify the most careful calculations. Welding stress may develop biaxial or triaxial strains, and notch effects may defeat all calculations. Slag, voids, undercutting, unfinished welds and sequence may all be uncalculated stress producers.

Welding engineering demands an understanding of these problems and of the methods to be used to eliminate them. Some problems deal directly

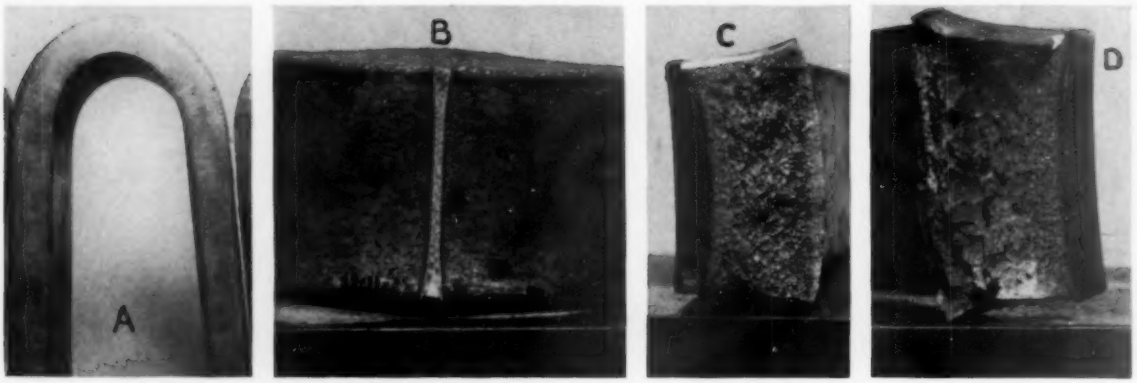


Fig. 2—Face bend tests. A—no notch; B — notch across one face; C—notch across both faces; D—a reverse bend of B. See text for details of failures.

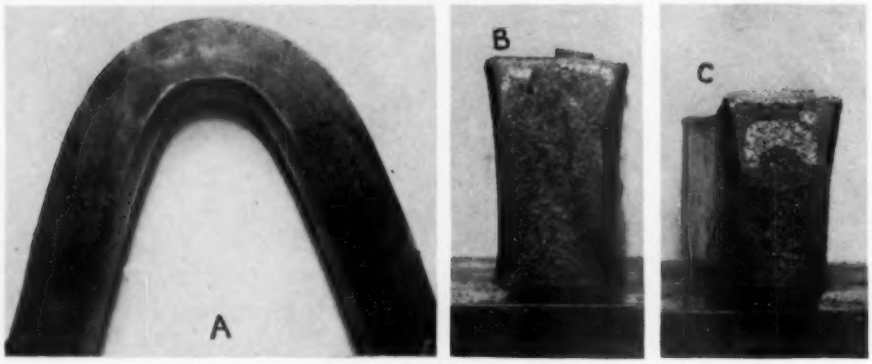


Fig. 3—Edge bend tests. A—no notch; B—notch across one edge; C—notch across both edges.

with welding. Others must be understood in order that welding may not be blamed. Careful and far-reaching supervision may be a major part of the solution. If the problem and its solution is known by supervision, many difficulties will never arise.

Demonstration of a few simple tests made on a physical testing machine has been found to be of material help to supervision. Such a demonstration before a group takes but a short time and creates a lasting impression. An outline of the test details follows:

Steel Properties

The steel used in the tests had the following chemical and physical properties:

Carbon	0.24%
Manganese	0.43%
Phosphorus	0.013%
Sulphur	0.029%
Yield strength	36,090 psi
Ultimate tensile strength	62,410 psi
Elongation in 8 in.	28.5%

Test 1. Tensile

The three reduced-section tensile specimens shown in Fig. 1 had a 1½ in. radius. Specimen A (area 0.756 sq in.) had an ultimate tensile strength of 62,410 psi and a 50% reduction of area.

Specimen B (area of 0.760 sq in.) had a 60 deg notch, 0.015 in. deep, across both faces at the reduced section. The ultimate tensile strength was 61,320 psi; reduction of area: 27%.

Specimen C (area of 0.759 sq in.) had a notch of the same depth and angle across both faces and edges at the reduced section. Ultimate tensile strength was 59,960 psi; reduction of area: 12%.

As the picture shows, the structure at the point of failure changes from A to C, and the results of C closely approach a condition of triaxial stress. A similar method of demonstrating triaxial stress by the use of round specimens is described in *Metal Progress*, page 946, 1943, and page 59, 1940.

Test 2. Face Bends

Fig. 2 shows four specimens which were bent in various ways in a guided jig or free support. Specimen A (area 0.513 sq in.) was face bent in an "as is" condition. A load of 8,390 lb was required, and there was no failure.

Specimen B (area 0.500 sq in.) was face bent with a 60 deg V-notch, 0.015 in. deep, across one face. A load of 8,150 lb was required, and there was no failure.

Specimen C (area 0.496 in.) was face bent with a notch of the same depth and angle across both faces. This specimen failed under a load of 5,530 lb.

Specimen D represents a reverse bend of B. It failed at 1,520 lb.

Test 3. Edge Bends

The three specimens shown in Fig. 3 were subjected to edge bends. Specimen A (area 0.507 in.) was bent in an "as is" condition. It did not fail under a load of 14,570 lb.

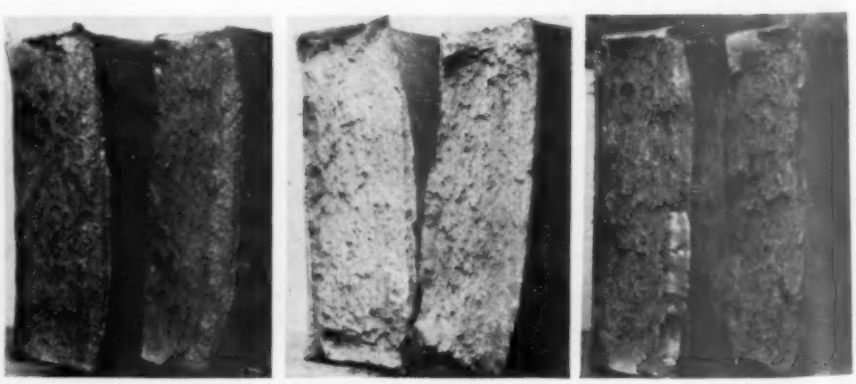
Specimen B had a 60 deg V-notch, 0.015 in. deep, across one edge. It failed under a load of 9,770 lb.

Specimen C (area 0.503 sq in.) had a 60 deg V-notch, 0.015 in. deep, across both edges. It failed at 5,260 lb.

Residual Stresses

Residual stresses are induced into fabricated structures by heating large sections, by forcing sections into welding position with hydraulic jacks

Fig. 4—Plates fractured in the heat-affected zone adjacent to a weld. The woody structure is characteristic of failures due to heating and quenching.



(or by other methods that are used to fit small sections or to cover up errors in final fabrication), by improper welding sequence or by leaving sharp corners in place or a radius or an unfinished weld seam. These produce individual or collective stresses that result in failure.

Major failures of welded structures at the dock, on the high seas and on reefs have given ample demonstration of these facts. The same conditions, however, are encountered in the process of fabrication and erection, and it is here that remedial steps must be taken.

The effect of residual stresses has been the subject of considerable research. Several universities have undertaken this work, and the welding research council has outlined a program of research. It has been suggested that a record be obtained from all sources of the actual failures encountered in the course of construction, their causes and the methods used to remedy the conditions. These records are available from inspection facilities and the supervisory staff. A review of some of this information indicates that failures repeat themselves from certain causes. The notch effect seems to be the principal offender, or at least it is the co-conspirator with other causes.

For those who wish to obtain a background on notch effects, two publications are suggested, namely "Prevention of Fatigue of Metals" by the staff of the Batelle Memorial Institute and the "Strength of Metals" by Gensamer.

Symptoms of Failures

It has been found that most failures in the field may be duplicated in the laboratory. Most failures leave telltale evidence of their causes through grain structure, deformation, a notch-effect nucleus, fatigue, etc., and diagnosis will be further aided by a set of laboratory specimens where failure has been induced by specified causes or various combinations of them.

Some observers believe that inspection facilities have never been adequate in our construction programs for the work involved. Inspection and supervision under these conditions must work hand in hand with mutual confidence. One construction yard has a plan that has produced a very low record of failures of any type. Under this plan, shipfitters and welders report any doubtful working condition to their supervisor, who immediately calls in inspection agencies for consultation. The plan sounds simple, but it must be based upon mutual confidence. The final proof of its effectiveness lies in the yard's record for safety and comparative freedom from failures.

The tests outlined here are not intended to be all inclusive but merely to act as a guide in demonstrating some of the fundamental problems to supervisors. The diagnosis of the causes of actual failures should be made available to all supervisory personnel so that they may prevent any future failures from the same causes.

Notch Effects

Notch effects have been demonstrated in classroom work by taking a 3 by 5 in. index card and exerting a straight pull with both hands. It is nearly impossible to tear the card. If the card is nicked on the edge, however, it will be found to tear or fail with little effort being exerted. The notch acts as the nucleus or concentration point of the applied energy. Some authorities believe that the notch acts as a first-class lever; the fulcrum, the shoulder of the notch, thus multiplies the force actually exerted at the bottom. Photoelastic test specimens seem to support this theory.

Notches may be as small as a hair line or as wide as a broad U in an unfinished weld or result from flame-cutting or a sharp angle corner. The laboratory may demonstrate the differences in effect by failing specimens with notches of different contour and depths and noting their effects on the ultimate amount of effort expended in order to produce failure.

It is interesting to note that a notch on the corners has practically the same effect as a complete notch across the face or across the edge. The zone of compression in failures exhibits a coarsening of the grain structure, the pattern depending on the moment of bending, the direction and the proportionate amount of stress and strain developed.

Other Demonstrations

Cracking in fillet welds may be demonstrated by welding a T-section, with one stiffener welded under compression and the other with a 0.020 to 0.030 in. clearance. The temperature of failures in fillets may be determined by the temper colors of the fractures.

The failure of fillets and notches may be demonstrated by testing various sizes of fillets and notches in round bar stock in a fatigue testing machine. The lower endurance limits for sharp notches should be compared with wider notches and also the effects of depth of the scratches or notches.

Two bars of the same stock may be tested for work hardening and its effects by peening one of the bars before testing.

Welding sequence may be demonstrated on small plates, but the fundamentals are usually well known to the qualified weldor.

Photoelastic patterns of stress distribution may be made by polarized light to show the effects of stress concentrations around undercuts, over welding, slag inclusions and voids.

Heat-and-Quench Failures

Failures due to heating and quenching exhibit a woody structure, which may be demonstrated by fracturing plate metal in the heat-affected zone adjacent to a weld. This structure is shown in Fig. 4.

A plate-metal failure often exhibits a normal grain structure on one side and a satiny appearance on the other. The satiny structure is usually caused by a rubbing of the surfaces and may be demonstrated on a testing machine. Typical fractures exhibiting this condition are shown in Fig. 5.

Adequate testing facilities should be at the disposal of every welding engineer who handles any volume of structural material so that he may use them for the purpose of educating supervisory personnel to prevent failures and in proper diagnosis of the failures that do occur. Most methods and techniques may be demonstrated in the laboratory before being put into production.

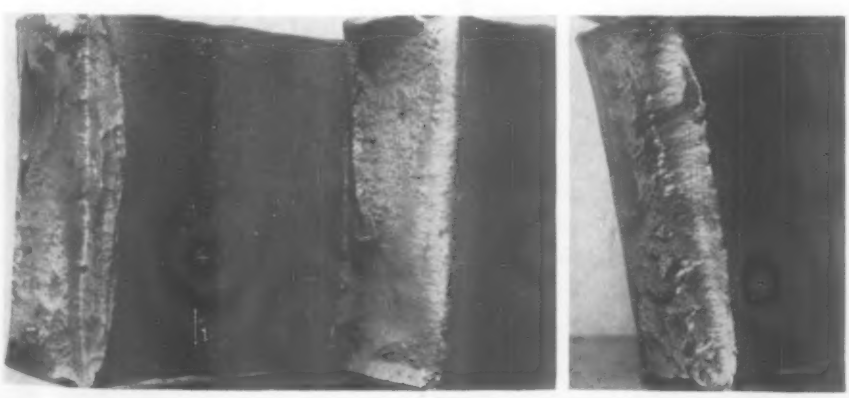


Fig. 5—The satiny structure (right side of each fracture) is caused by a rubbing of the surfaces.

★ PRODUCTION

Welded Handling Equipment

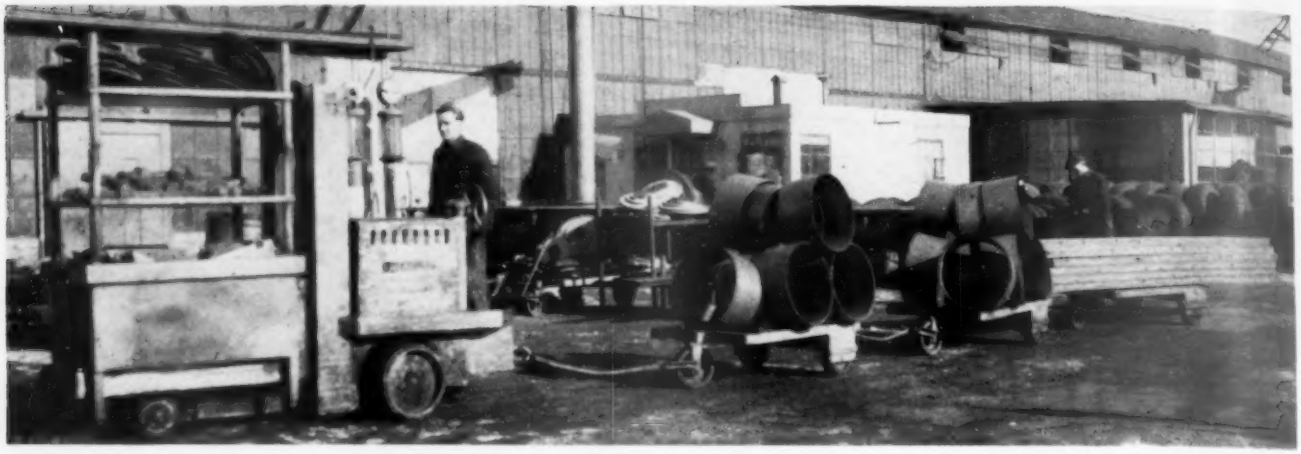


Fig. 1—Mechanical lift buggies with arc-welded steel tote bins, skids, etc., form very effective factory transportation units.

★Part One—The transportation of parts and assembled units inside the factory requires as much planning as the actual manufacturing. In a two-part article, Mr. Brooking tells how arc welding is used to fabricate a wide variety of steel units for handling and storage.

By WALTER J. BROOKING

Director of Testing and Research,
R. G. LeTourneau, Inc., Peoria, Ill.

One of the most vital parts of a factory's organization and material equipment is its transportation and handling system. It is just as important (if not more so) that as much study and planning for effective functioning be done on transportation and handling as on the actual manufacturing of the product.

Three Cost Factors

Equipment for factory transportation involves three general factors of cost: first, the material and the labor involved in the original manufacture of the equipment; second, the cost of operating and maintaining it in service; and third, the factor of space. Since space is almost always expensive, the moving and handling equipment which best utilizes factory space has a great advantage over other equipment.

The arc-welded method of fabrication offers possibilities for very real savings in each of the above mentioned factors when it is compared to other common methods of manufacturing such equipment. To begin with, the arc-welding process almost automatically specifies steel as the raw material. Steel, especially the low-alloy, high-tensile steels which can be purchased at moderate price in standard mill plates and shapes, has many advantages as a material for transportation and handling units. It is light and strong, allowing a greater loading per unit of volume of raw material than any other common material. It is very rigid and therefore can withstand the severe treatment which most transportation units are expected to withstand. Few units of equipment in a modern factory, incidentally, are subjected to more rigorous service and abuse than the units which carry the materials as they flow through the factory. This is especially true of factories whose products are of steel or other heavy material.

Other Advantages

Steel is very resistant to wear such as rubbing and scraping; it is resistant to a wide range of temperatures and can be rendered resistant to chemicals by alloying or by protective coverings. Nor is it subject to destruction by living things such as fungi, moss, termites or rats, vulnerability to which makes many other materials undesirable for making containers or more or less stationary units such as jib crane posts and similar structures. Finally, a great variety of gases, liquids and solids can be transported in steel containers without leakage, provided that the joints of the container are designed for leakproof welded seams.

The full benefit of steel as a material for making transportation or handling equipment is realized when arc welding is used to join together simple plates and standard structural shapes after they have been sawed, sheared or flame-cut to the desired shape. The ease and simplicity of design, the fundamental economy of material, the economy realized in fabrication, the effectiveness of the finished product as a functioning piece of equipment and its relative indestructability make such equipment the best that can be devised for the transporting or handling of materials.

The examples of arc-welded steel containers and machines for transportation and handling purposes at R. G. LeTourneau, Inc., a factory which manufactures heavy earthmoving equipment, will serve to illustrate the practicability and economy of applying the arc-welded method of fabrication to such shop equipment.

Power Lift Buggy Skids

The use of the power lift buggy shown in Fig. 1 for transportation of parts and materials involved the building of containers and racks which could be as universally used as possible. General adaptability, ease of

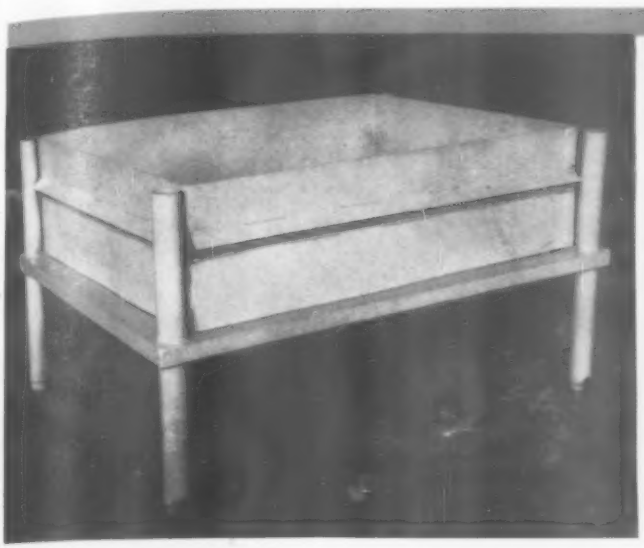


Fig. 2—The removable sideboard structure on this skid is convenient for loads of small parts. However, the skid is more frequently used for the transportation of large parts, held in place by the skid legs.

Fig. 3—Rigid, light and durable, this arc-welded tote bin has a load capacity of over five tons of solid parts.

temporary storage, handiness for loading and unloading, strength and serviceability were the prime requirements.

Fig. 2 illustrates one of the most generally adaptable units built for the purpose. It is essentially a rigid, pipe-legged platform with removable side walls to hold material on the main plate. The bottom of each leg is capped with a blunt cone tip, which allows the unit to be pushed or skidded into a tight place. These tips also serve as pins for piling, each tip resting in the top of the pipe of the skid below it (see Fig. 4).

The removable, welded sideboard structure shown in the picture (Fig. 2) is used with the skids where a deep portable bin would be difficult of access. The design of the sideboard is characteristically simple; it consists of a long, thin plate bent to form three corners and welded at the fourth corner. Four pieces of light angle iron are intermittently welded to the plate to serve as reinforcements.

Welded Tote Bins

The tote bin, Fig. 3, is essentially a skid with permanent sideboards, a reinforced bottom and loops for handling with a hoist or crane.

Both skids and tote bins have a capacity of over five tons, yet either when empty can be slid on the floor by one man or carried by two men for short distances. Such lightness combined with strength could not be achieved with wood, and the combination of lightness and rigidity could not be obtained with steel plates bolted or riveted together because of the weight of lapping needed for joints and reinforcement plates.

Except for an occasional cleaning and painting, there is practically no maintenance cost on either the skids or tote bins. Some of each have been in constant and very rigorous service for over eight years and have been subjected to very hard use and heavy loading. If either bolts or rivets had been used, the strenuous service of those years would probably have worn them to such an extent that they would have doubtless sheared in two.

Bins for Storage

Fig. 4 shows the adaptability of the foregoing bins and skids to the storage of a large amount of material in a small space. The compactness of the welded units gives a maximum use of storage space, and they are strong enough to be piled four high, all loaded to capacity. Bins may be piled at random with skids, resulting in a great freedom in the arranging of stock in temporary storage.

Fig. 4—Large variety and quantities of stock parts are available in these simple movable piles of transportation bins and skids.

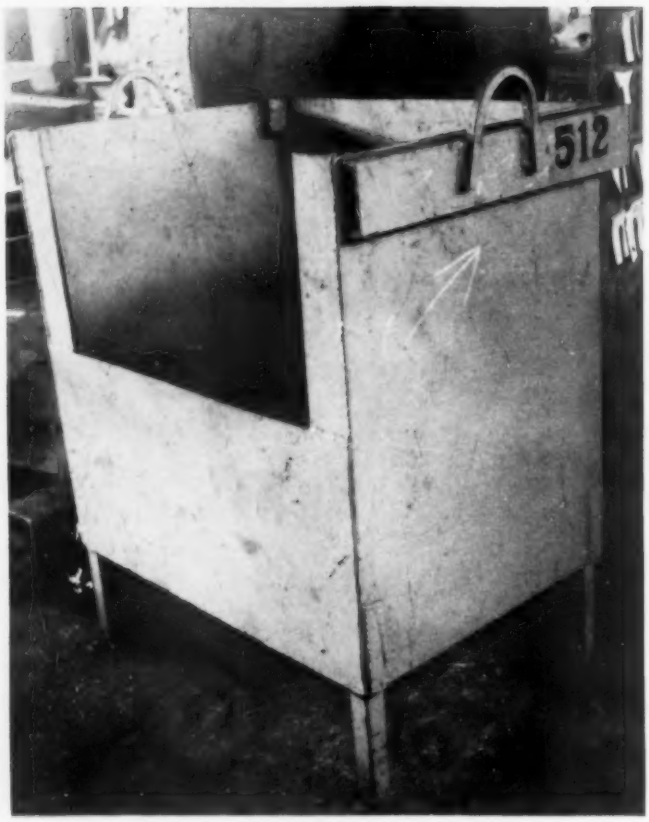


Fig. 5—A standard tote bin used for steel scrap storage in the cutting department. Its walls are made of 1/8 in. steel and it holds a maximum load of ten tons.

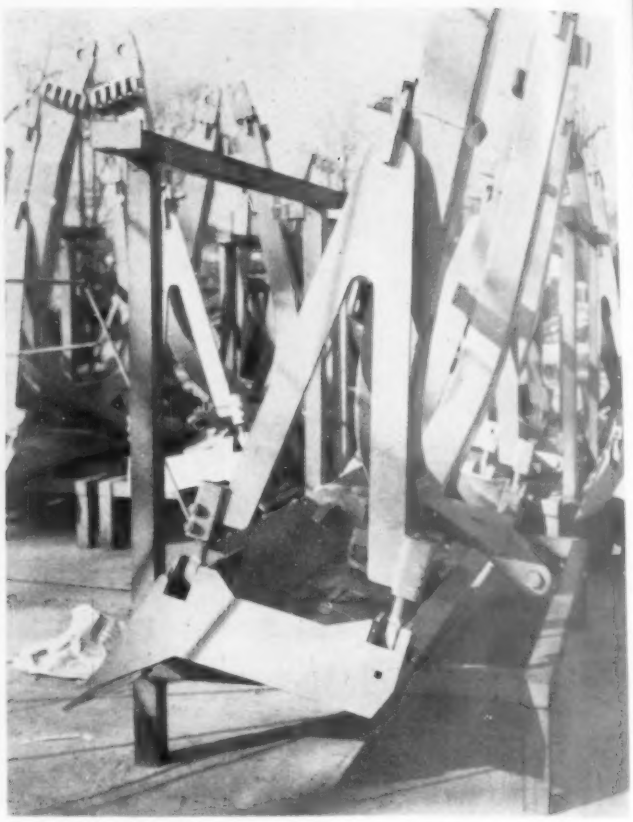


Fig. 6—This simple hauling and storage rack reduced handling and storage of these large machines to a small fraction of previous handling costs.

Fig. 5 illustrates a modified bin, made deeper for the handling and storage of steel scrap. This bin is a simple modification of those previously shown, using the same weight of material. It has a capacity of about ten tons of solid, small pieces such as punchings. Boards are inserted in the front as the bin is filled. If necessary, these bins can be stacked two or three high.

Storage Racks

Another form of portable rack or skid is made of box sections built up by welding two angles together. The rigidity of the welded joints (even though they are small and far removed from the top of the rack legs) provides ample structural strength and does away with the need for bracing, which would obstruct the spaces used for loading the racks. The mechanical lift buggy moves these racks in the same way it does the other skids and bins, and they are highly effective for the storage of materials in warehouses. This type of skid is made in two different sizes to accommodate special materials.

These racks (and those which follow) illustrate two of the greatest advantages of the arc-welded method of manufacture: the simplicty of design for a piece of equipment and the ease with which the design of one unit may be modified to make a similar unit to serve another specific function.

The similarity in principle of the skids and racks shown so far is obvious. A simple modification to perform a specialized function is illustrated by a rack on which may be mounted four separate machines as they come from the assembly department for painting and subsequent storage.

A Rack for Large Machines

The rack in Fig. 6 is similarly specialized to serve as a transportation rack, a paint rack and a storage rack for the machine that is shown on it. This rack is truly characteristic of arc-welded simplicity and economy. Previously, the large machines had to be hauled on buggies and stored on a stationary platform.

The ease with which parts may be cut out with a flame-cutting torch and welded together allows the shop man to use his natural ingenuity to make things from steel in the same way that his forebears for many centuries made things from wood with a saw and dowels or nails. That fund of ingenuity is very important to the efficiency of shop fixtures and equipment since the shop man (superintendent, foreman or skilled workman) is in the best position to see the conditions for which the machine or fixture must be designed. Arc welding allows the shop man to do his own designing.

Wheeled Wagons and Buggies

Fig. 7 shows a more mobile type of shop buggy on wheels for the hauling of heavy loads. These are pulled behind the lift buggy (as shown in Fig. 1) for interdepartmental hauling or hauled by hand for short moves within departments. One buggy will haul a load of over ten tons.

The simplicity of these units is typical of arc-welded design. The basic elements are: a main plate or platform lying in a supporting frame of angles and box sections; three wheels attached to the platform by the simplest of gussets; a tongue for a handle. The three-wheeled design gives added lightness and mobility over a four-wheel design and reduces the material cost. No other common material than steel nor widely applicable fabricating process than arc welding could make such a light, strong, serviceable, easily handled shop buggy for a comparable price.

A simple expansion and modification of the small shop buggy is a buggy designed to move large earth-

moving machines, some weighing as much as 14 tons, from the assembly department in and out of the paint shop. It also serves as a paint rack while the machines are being cleaned and painted.

Other Hauling Units

A further departure from the three-wheeled buggy is illustrated by a four-wheeled cart (Fig. 8) designed to haul heavy plates or welded sections which are relatively thin but have a large surface area. The simple, functional design employs no excess material nor weight, yet the unit is rigid, practicable, safe and serviceable. Large plates may be easily and surely moved about on edge in this cart without blocking the aisles or congesting factory moving.

For quick delivery of steel parts from the factory parts rooms, the two-wheeled buggy shown in Fig. 9 was designed. This is simply a light steel box with convenient handles and two pneumatic tire-mounted wheels; it embodies lightness and maximum strength with ease of handling and requires almost no service nor maintenance.

Because of the small amount of material used and the low cost of fabrication by arc-welding, it is practicable and economical to make special units (such as those illustrated) for special factory jobs. The increased efficiency of a unit created to do a certain job as compared to a more generalized unit will often more than pay the cost of the special unit.

Monorails and Conveyors

One of the most important developments in transportation and handling systems for modern large-scale mass-production plants has been the utilization of monorails, chutes and roller conveyors. The fact that such equipment provides an automatic transfer or transportation service past a series of machines or along an unchanging route past work stations enables an automatic organization of the flow of work through the plant with a minimum supervision and a minimum of labor spent in handling.

For the construction of such equipment, arc welding offers the advantages of space-conserving simplicity of construction, elasticity of design and economy of raw materials. All of these make welding an invaluable tool in the manufacture and installation of modern automatic transportation and handling systems.

NEXT MONTH: Mr. Brooking will discuss arc-welded monorails, roller conveyors and various factory cranes and hoists.

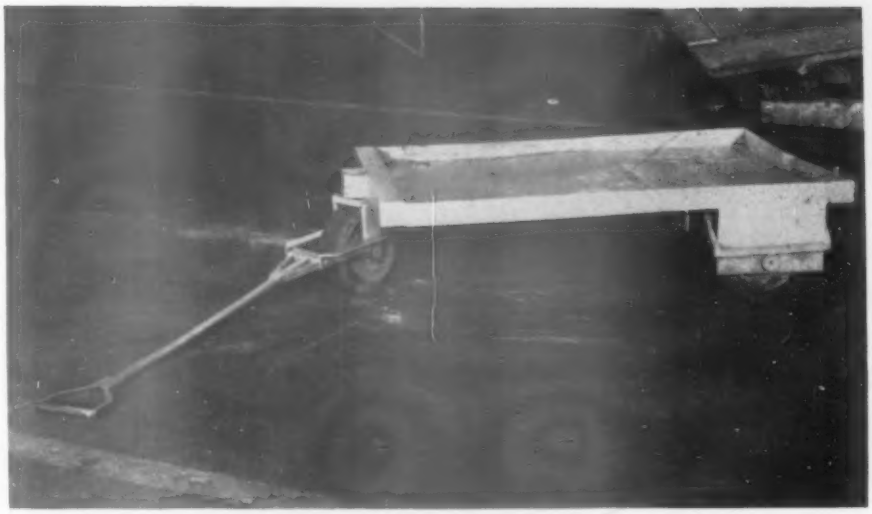


Fig. 7—A general-purpose heavy-duty shop transportation buggy. Its welded construction combines a maximum strength and mobility with minimum material, weight and service cost.

Fig. 8—An effective moving vehicle for large plates or thin structures. The load is hauled on edge. Note the simple, unreinforced rigid design made possible by arc welding.

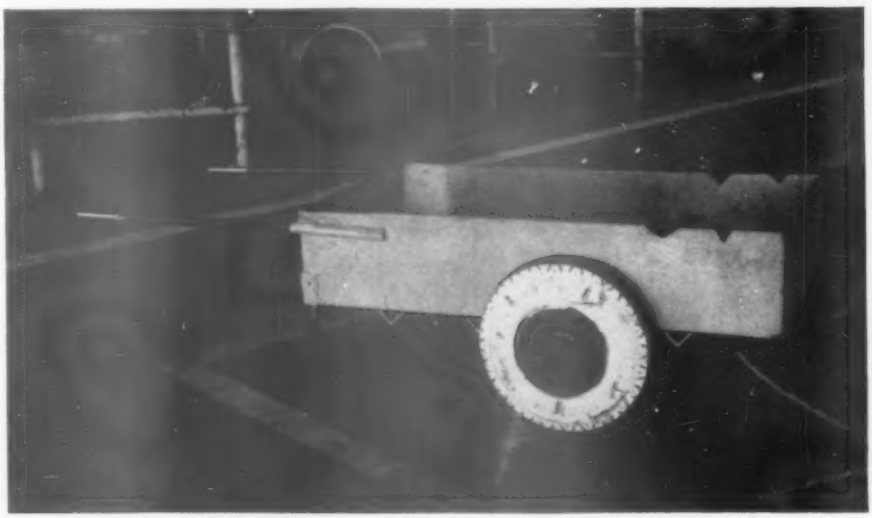


Fig. 9—A light box on rubber tires used for delivering light loads quickly. Welding reduces the design to its simplest functional elements.

★★★ Building Ships Indoors

By T. B. JEFFERSON

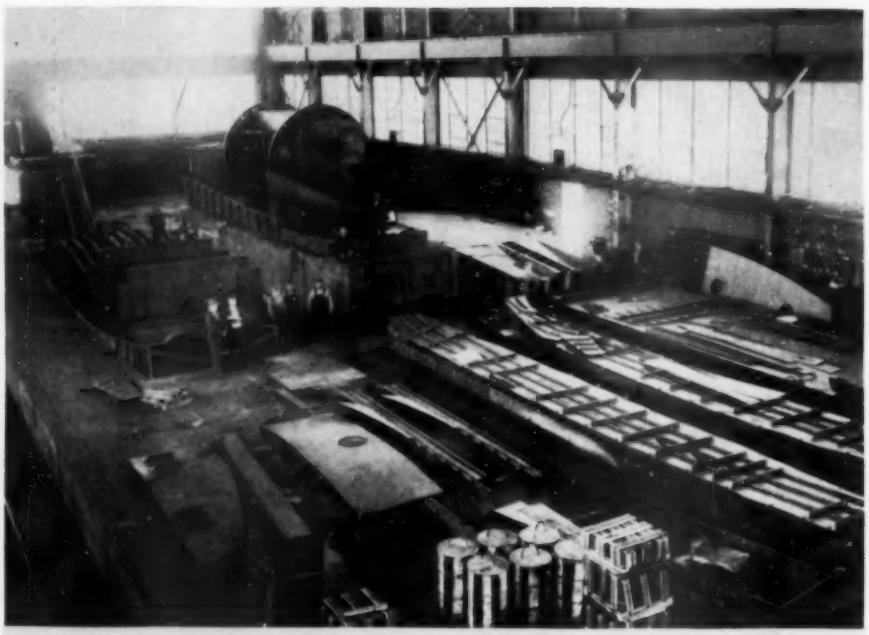


Fig. 1—General view of production set-up for LCM-3s at Armco's indoor shipyard.

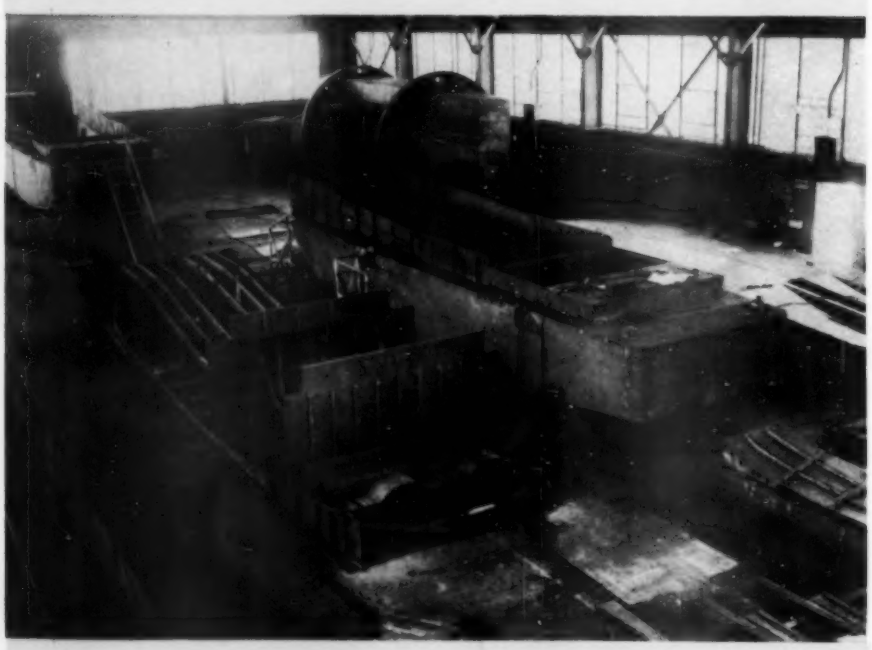


Fig. 2—Jigs for assembly of sides, bulkheads, etc. to the bottom section.

SHIPYARDS are generally thought of as huge places covering acres and acres of land, but the indoor shipyard of The American Rolling Mill Co. in Middletown, O., doesn't conform to the conventional picture. Although this yard is busily engaged in building LCM-3s (production schedules call for two boats a week), less than ⅓ acre (13,000 sq ft) is devoted to shipbuilding. Of this space, 10,000 sq ft are actually used for assembling, while the remaining 3,000 sq ft are devoted to material preparation.

The LCM-3, the Navy designation for Landing Craft Mechanized, is a small ship having an overall length of 50 ft, a beam of 15 ft and depth of 11 ft. The draft of this vessel, loaded, is only 3 ft or so, although the completed hull weighs 29,000 lb and the finished boat displaces 25 tons. An LCM-3 is capable of transporting a 30 ton load.

Economy Factors

Many factors combine to make possible the unique Armco shipyard —the advantageous use of jigs and fixtures, the maximum utilization of floor space, the company's wage-incentive plan. Welding hours were cut approximately 50% by a special 360 deg welding positioner capable of taking an entire LCM-3 hull; thus production was doubled. The positioner eliminates all overhead, vertical and horizontal welding, and this is accomplished at a cost of only $4,000 to $5,000 for the positioner and welding jigs. The cost figure contrasts sharply with the amounts usually spent to obtain straight-line production methods for this kind of craft.

Mile of Welds per Hull

Approximately 6,000 linear ft of welding are required in the construction of one of these hulls. Most welding is done on sheets of ⅛ in. or less thick, though there are some plates as heavy as 3/16 and ¼ in. The weldors who do this work had been chiefly engaged on the welding of LST sections, which are ¼ in. or thicker; consequently, it was necessary to train them to work on light-gauge material. Additional weldors also had to be trained, necessitating the opening of a welding school.

Three weeks of intensive training in the school were followed by actual welding practice in the ship until the trainee had qualified for the Navy test. After satisfactorily passing the test, he or she went into some phase of the shipbuilding program. Approximately 30% of the trainees were women.

Positioned Subassemblies

Insofar as possible, these LCM-3s were built in subassemblies. Fig. 1 is a general view of the floor plan of the production set-up for the con-

LCM-3s are turned out two a week in Armco's unique indoor shipyard, which occupies less than a third of an acre. Jigs and positioners are skillfully used.

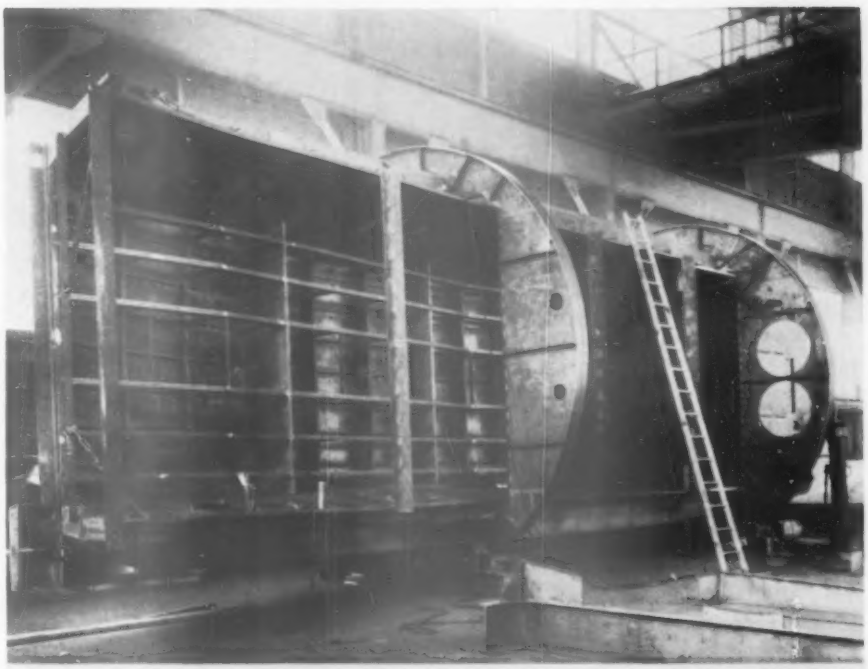


Fig. 3—Two large steel rings resting on dollies make a positioner that is capable of swinging an entire LCM-3 hull throughout 360 deg.

Fig. 4—Sandblasted and painted, this boat is ready for shipment to the Ohio River, where it will be given its trial run.

struction of these hulls. In the foreground is shown the subassembly of the sides and other parts of the boat. Stiffening ribs lying in a horizontal plane are welded to the flat-positioned side of the boat. Every effort is made to position every subassembly so that all welding will be done in the flat position. It will be noted in Fig. 1 that the side shell plates are placed on contour jigs for both tacking and welding. In this manner the proper curvature of the plates is obtained without a forming operation.

In the center background of Fig. 1 will be seen, upside down, the assembly for the bottom of the boat. All parts of the bottom, including cross members, longitudinal stiffeners and cargo deck beams are assembled upside down in a jig, after which they are covered with the bottom plating. The assembly members are then tack welded to the plating (using an overhead position), after which the tack-welded assembly is turned over onto one of two identical jigs for final welding. To insure that the bottom plating will be free of buckles, it is frequently weighted with oil drums filled with concrete.

Final Assembly

The final assembly jigs are shown in Fig. 2. It is here that subassemblies of the sides, various bulkheads, etc. are tack welded to the bottom to finish the boat. In the left center, for example, the engine room bulkheads are in position; in the center is an LCM-3 with the stern deck in place. When assembled by tack welding, the boats are lifted by crane to the welding positioner shown in the center background for their final welding. As previously stated, this positioner rotates through a 360 degree angle so that all welding may be done in the flat position.

The positioner, Fig. 3, is in reality little more than two large steel rings. These rings may be opened to receive the subassembled, tack-welded boat, after which they are bolted together to hold the boat for final welding. The craft may be positioned at any desired angle by merely rolling the rings on their supporting dollies.

The final assembly welding requires considerable skill. The boat is divided into ten compartments, all of which must be tested for leaks as part of the final inspection. Each compartment is air tested and must not register greater than 1 oz pressure drop in 10 minutes—a severe test for any weld joint on thin-gauge material.

After testing, the cargo deck plates and treads are placed in the boat and it is sandblasted and painted. Fig. 4 shows an LCM-3 at the final stages all ready for shipment to a yard on the Ohio River at Ironton, O. Here the LCM-3s are outfitted and launched for their initial trial runs on the river. When successfully passed, the craft goes to war.

★ PRODUCTION

"Fustest with the Mostest!"

By JAMES T. BREWSTER

Fig. 1—Half-trac tank destroyer mounting a 75 mm gun. Always ready, this unit can rush from ship to land and into action with little or no preparation. It can even run through water up to a depth of 2½ feet.

General Forrest's recipe for victory still holds good in modern mechanized war. And thanks to welded scout cars, half tracs and other military vehicles, *we* have been getting there "fustest" ever since North Africa.

TO MOST of us new cars and trucks are something relegated to the dim, distant past. All of us are aware that the nation's automotive plants have been kept busy turning out military supplies such as aircraft engines, aircraft and component parts, guns, tanks and other fighting equipment. Some automotive plants, however, have been able to retain their assembly line to produce jeeps, trucks or other war vehicles similar to their original products. The White Motor Co., Cleveland, is one of these fortunate organizations.

Five types of military vehicles are being manufactured in the all-out production schedule of White. The vehicles are referred to in military terminology as scout cars, half-tracs, tank destroyers, prime movers and cargo trucks. Welding is important in the fabrication of all of them.

White Motor Co. started to build military vehicles as far back as 1934, when its collaboration with the U. S. Army Ordnance Department resulted in the development of a scout car. Production development followed, and even before the present war White was engaged in a substantial manufacturing program. This schedule was naturally greatly accelerated by the outbreak of hostilities.

Fig. 2—Another half-trac tank destroyer on another front. The 75 mm field gun blasts the way for the infantry, knocking out tanks and enemy strong points.

Scout Car

The four-wheeled scout was originally used quite extensively for reconnaissance work and the fast movement of personnel. Actual field operations developed many other uses to be added to the basic functions until today the scout car has become an extremely versatile unit.

This vehicle exerts its driving power through all four wheels and has also a big roller of welded construction at the front. The roller helps lift the car out of ditches and depressions, enabling it to travel over extremely rough ground and up the steepest inclines. While high enough to override obstacles, the scout silhouettes low, presenting a limited target. Armor plate at sides, front and back gives the vehicle and its crew protection against shrapnel and against rifle or machine gun fire. The scout is made into a fighting unit by machine guns, mounted on a circular track or on special mounts for 360 deg action. Many other features, including self-sealing tires and fuel tanks, make it a highly dependable military vehicle. Offering eight speeds, it can travel at high speed or negotiate steep hills or embankments under the most difficult conditions.

The Half-Trac

Early wartime use of the four-wheeled scout car suggested the need

Fig. 3—Tack welding a reinforcement ring in a length of steel tubing—one of the early steps in the fabrication of rollers for half-tracs and scout cars.

Fig. 4—After tacking, the final weld on the half-trac roller reinforcement ring is made with an automatic welder. The fixture holding the roll revolves at a regulated speed.

for another vehicle which would offer even greater support and traction for marshy areas or desert sands. Thus was born the half-trac. Like the scout car, the first pilot model of the new unit was built by White in collaboration with the Ordnance Department. In its early days the principal use of the half-trac was likewise in reconnaissance work and the fast movement of troops. Such use continues today, but extensive application of the half-trac for combat duty has made its rôle even more dramatic.

The half-trac (Fig. 1) is similar in chassis and body structure to the four-wheeled scout car, but instead of operating on four wheels it is supported in the rear by an endless belt track driven by the forward axle of the rear bogie. This gives it great support and traction power on soft and broken ground. Power can also be applied through the front wheels at the same time, so that driving force is attained both front and rear.

An extremely low horsepower-to-weight ratio results in high acceleration. The eight speeds are again available, making it possible to pull out of wet, soggy marshland in extremely low gear, to attain high speed on the highway or level ground in high gear or to take difficult terrain at intermediary speeds. As in the case of the four-wheeled scout car, the crew or combat personnel are protected by machine guns and armor plate, and two-way radios enable the personnel to keep in touch with headquarters.

Tank Destroyers

In addition to other uses found for these versatile vehicles, they were soon being employed as gun carriers for combat purposes. Mortars of varying size were tried out as were field guns up to 105 millimeter—likewise half-tracs were employed as mobile mounts for anti-aircraft guns. The record in all of these artillery branches has been outstanding. Half-tracs mounting 75 mm guns (Figs. 1 and 2), for instance, have been well labeled "tank destroyers" since the results were nothing short of sensational. Much faster than tanks and with equal or greater fire power, they could rush into action quickly to destroy the enemy's armored units. Widely used on all fronts, such tank destroyers were one of the deciding factors in stopping the rush of Rommel across North Africa.

Mobile Ack-Ack

In the antiaircraft field, half-tracs formerly mounted single guns and then two-barreled guns. Good results were obtained in both cases, but today in the four-barreled gun we have a further development which far eclipses all past performances. The half-trac with the four-barreled anti-aircraft gun is known as the M-16. While comparatively new, it has been employed in North Africa, Italy, France, along the Rhine and beyond with outstanding success. The M-16 is also employed on shipboard to protect troops prior to landing. In the North African landing, for instance, a multiple antiaircraft gun on a half-trac shot down two enemy planes before it had reached land.

Always ready, the M-16 is decidedly useful in protecting our ground forces from strafing by enemy planes. Each of its four guns is of 50 calibre and has a muzzle velocity of 2,000 feet per second. The multiple weapon can fire 2,000 rounds a minute—unbelievable as that figure seems. The fact that all four barrels can be synchronized in a single action on the same target makes the M-16 a decidedly destructive weapon.

The multiple gun is mounted on a revolving turret and swiveled for vertical action up to 90 deg or for low fire to 10 deg below horizontal. The gunner is cradled within the mount and turns the gun up or down and sideways through a single motor-driven control. Ammunition tenders fill the ammunition chests as needed. A special target sight enables the gunner to bring enemy planes into quick focus.

The entire vehicle with gun and mount weighs 20,000 lb. It is attended by a crew of five, who carry Tommy guns and other shoulder weapons for added protection.

Welded Steel Rollers

Both the half-trac and the four-wheeled scout car, when used for reconnaissance work and the rapid movement of personnel, are provided with large, all-welded steel rollers to lift them out of ditches or

Fig. 5—Welding the bearing head into an end of the tubing.

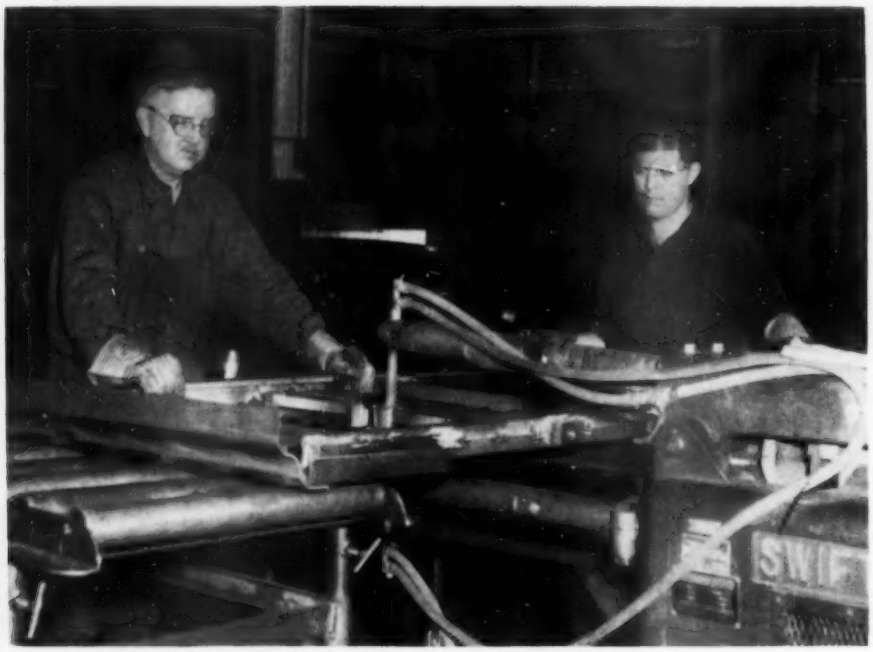


Fig. 6—Spot welding a back panel of the cab of a heavy-duty prime mover. Special jigs hold the pressed steel forms for this operation.

shell holes or to enable them to climb steep embankments. These rollers are made by welding two reinforcement rings and two bearing heads in a length of steel tubing. The rings are equally spaced with the aid of a special locating jig, then tack welded at three points (Fig. 3) to hold them in place for the final weld. The latter is accomplished automatically in a special welding fixture designed to revolve at a regulated speed, (Fig. 4). The operator directs the arc to the line of weld, which is in this case slightly more on the insert ring than on the tubing. A continuous bead is laid along one side of the ring.

The bearing heads are welded into the ends of the tubing in a similar manner in the same automatic fixture, (Fig. 5). The heads contain bearings or bushings (steel castings) which have previously been tack welded into position.

Rear Track Assembly

The half-trac offers many examples of welding for strength, particularly at the points of strain and stress. Welding is employed extensively in the rear track assembly, especially in the bogie system on which the load rests. The various welding operations in the bogie system are as follows:

First, bogie crab assembly. This is made up of two heat-treated studs and two arms which are steel forgings. The cross studs are welded into first one arm and then the other by means of a resistance welder.

Second, bogie arm and pin. This assembly, on which the bogie crab rests, is made by arc welding a pin or stud into the bogie arm. The weld is made around the butt of the pin after it has been fitted into a hole in the bogie arm. The pin is beveled for a 45 deg weld. The bogie arm-and-pin assemblies are fastened to the bogie arms, each pair of which links two pairs of rollers.

Third, track rollers. These are made by welding two outside flanges after they have been pressed onto a tubing and positioned in a special fixture. The tube itself is finished to indicate the correct seat of the flanges, which are joined by automatic welding to the hub tubing. An oil hole is drilled in the hub; the flanges are finish-turned to take the wheel size and are then drilled and tapped for wheel studs. Each stud is welded and locked in from the inside of the flange.

Fourth, brackets for the top roller in the endless belt track. These are steel castings in which heat-treated steel bushings are manually welded. A continuous bead is laid around each bushing.

Many other units making up the half-trac are also welded, but the examples enumerated above are among the most important.

Prime Mover

The heavy-duty prime mover, which is used for transporting men and war materials as well as for its basic function of towing artillery, also has many welded features. The cab, for instance, is an all-welded job. White's experience in building the all-welded steel body of the White Horse* well prepared the company to put out all-welded cabs for army vehicles. The subassemblies are first made by spot and seam welding the necessary pressed steel forms in special jigs (Fig. 6), and the various subassemblies in turn are brought together in larger holding jigs and combined by welding (Fig. 7). The resulting cabs are units of great strength.

Welding is truly winning the war, for it is welding that has made possible the better ships, planes, tanks, guns, trucks and all the other equipment that has made the struggle so hopeless for our Nazi and Jap enemies.

*See "All-Welded Construction for White Truck Cabs," THE WELDING ENGINEER, April, 1941.

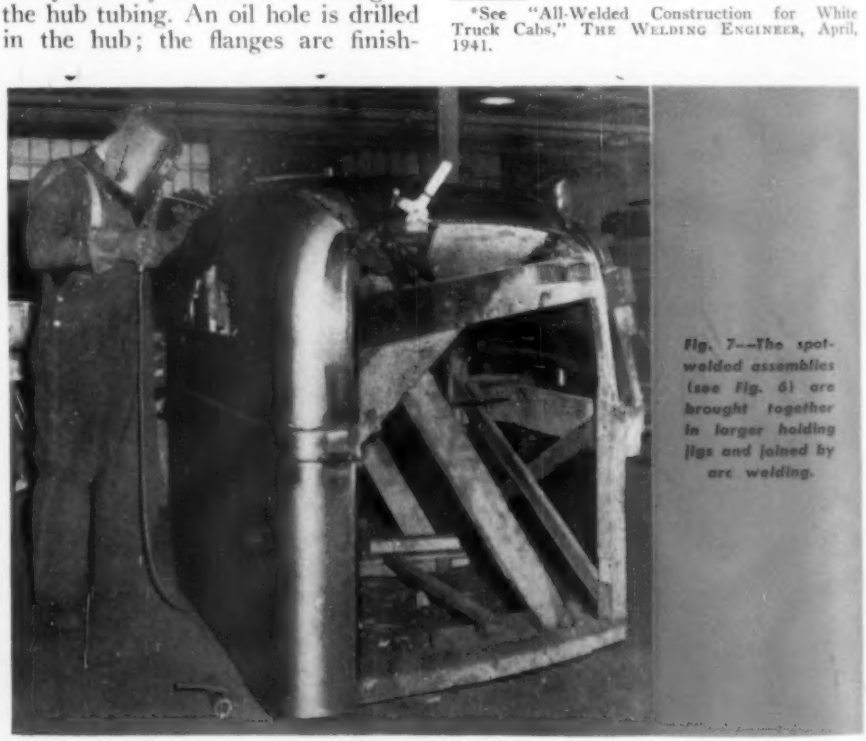


Fig. 7—The spot-welded assemblies (see Fig. 6) are brought together in larger holding jigs and joined by arc welding.

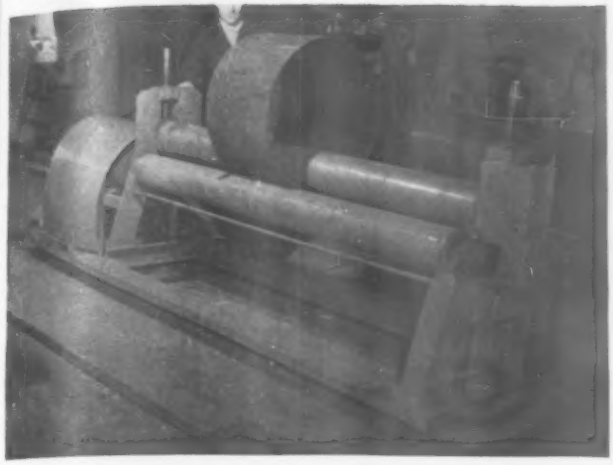


Fig. 1 — Plate-bending equipment designed and built by R. Brogne, Riverview Welding Co., New Philadelphia, O.

Fig. 2—Flame-cutting machine for cutting circles. It is driven by an auto generator powered by a 6 volt battery.

Jobs in a Job Shop

Everything from repair of cracked engine blocks to the building of a 75 ton hydraulic jack is all in the day's work for Mr. Brogne. Here are some of the jobs he's done.

By **R. BROGNE**
Proprietor, Riverview Welding Co.

TYPICAL of the welding work being done in the Riverview Welding Co. shop at New Philadelphia, O., are the jobs illustrated in the accompanying pictures. All of the equipment shown was designed by me and made under my direction.

Plate-Bending Machine

Fig. 1 shows equipment which will bend and form sheet or plate as long as 6 ft and as thick as ⅜ in. The two bottom rolls are of 6 in. tubing with ⅞ in. wall thickness; discs were welded to the ends. The top roll is a solid round bar of 7 in. diameter. The pedestal was fabricated by welding 4 by 6 in. angles and 5 in. channels; a 2 by 2 in. angle fillet was welded along the top for additional stiffening.

The loading and unloading end of these bending and forming rolls was built by welding ½ by 8 in. plate and 4 by 6 in. angles. It swivels at the bottom and is locked in place with a ½ in. round bar. The top roll adjusts up and down by means of a screw.

Cutting Machine

Fig. 2 shows a flame-cutting machine that was also designed and built at our shop. The vertical column was made by welding a plate across a 4 in. channel to produce a box section. The horizontal arm is made from a 4 in. I-beam by welding plates along both sides to produce a box section with the I-beam web down the center. A 3 by 5 in. bearing bushing was then welded on the end of the arm.

An auto generator operated by a 6 volt battery is the driving motor for this machine. The travel speed can be adjusted by changing the size of the pulley on the motor. One of the pulleys and the pinion and gear (shown in the center) were taken from an old washing machine. The cutting torch is driven to cut circles, either with a square edge or with a bevel, and it can be adjusted to any radius up to 4 ft. A clutch arrangement permits the drive to be disengaged so that the cutting torch can be turned to any position by hand.

Hydraulic Jack

Fig. 3 shows a 75 ton jack I designed and built for use in the shop. The cross members are 7 in. channels which have ¾ in. plate welded on the inside web for strengthening. The cross members are further reinforced by truss work, made from 3 by ⅞ in. bar stock as shown. The vertical members are 8 in. I-beams reinforced by 2 in. plate, 5 in. wide. The feet are 12 in. I-beams held together by 3 by 3 in. angles.

Fig. 4 shows how a truck engine block with a 1 ft crack was welded with a coated nickel-alloy electrode for welding cast iron. The crack was welded about one inch at a time, and the deposited metal was allowed to cool between welds. The inside of the fender was removed to secure easier access to the crack and was then replaced by welding.

Fig. 3—This 75 ton hydraulic jack was also designed and built in Brogne's shop. Welding played an important part in its fabrication.

Fig. 4—A truck engine block crack that was repaired by welding.

* * *

The illustrations are reproduced through the courtesy of The Lincoln Electric Co., Cleveland.

★ PRODUCTION

Preparation for Spot Welding

By **B. F. DUNLAP**
Process Engineer, Vultee Field Division, Consolidated Vultee Aircraft Corporation

A motor cowling accessory panel being spot welded. To conform to Army-Navy specifications, the surfaces of all aluminum-alloy parts have to be prepared by chemical or mechanical cleaning prior to spot welding.

IN ORDER to conform with Army-Navy specifications, engineers of the Consolidated Vultee Aircraft Corp. have developed both chemical and mechanical processes for the surface preparation of aluminum-alloy parts for spot welding. The chemical process is used in preparing parts made from either clad or non-clad materials, while the mechanical process is generally used in preparing "structural" and special parts.

Chemical Preparation

Chemical surface preparation involves: (1) a washing operation in aviation cleaner to remove dust and soil and (2) an oxide-removal operation. The parts to be cleaned are racked in stainless steel baskets for convenience in handling (see Fig. 1) and are then immersed in an aviation cleaner solution (which has a tempera-

Fig. 1—Air ducts, which form part of the B-24 engine assembly, are loaded into a wire-mesh stainless-steel basket preparatory to immersion in an aviation cleaner degreasing solution.

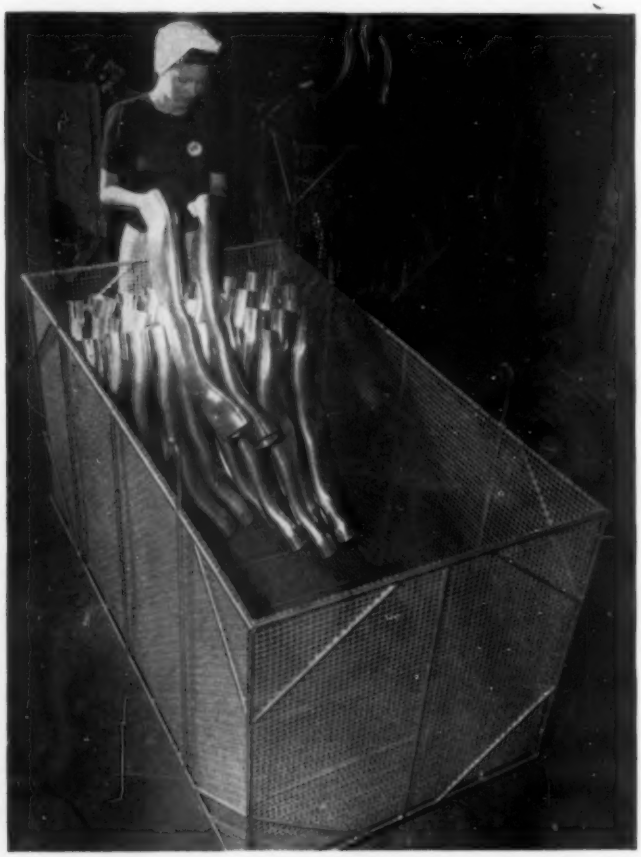
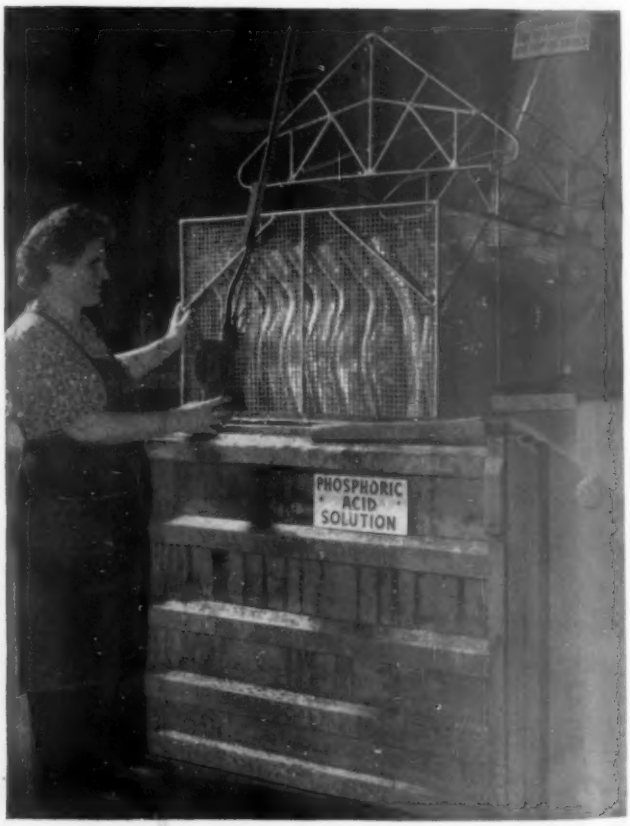


Fig. 2—A basket load of B-24 air ducts, made of 52-SO aluminum, is immersed in an oxide-removing solution. The frame of the wire mesh basket is of stainless steel bar stock, welded with stainless steel rod. The bar stock prevents the collection of contaminating fluids.



The industry agrees that aluminum-alloy parts cannot be satisfactorily spot welded without surface cleaning and oxide removal. Opinions differ, however, as to the best ways of cleaning. Here is a tried and tested procedure.

ture of 170F±10F) for a period of ten minutes.

The aviation cleaner solution is prepared by heating a clean tank ⅔ full of clean tap water to a temperature of 180F and adding 37½ lb of a proprietary aviation cleaner for each 100 gallons of final solution (or six ounces per gallon). The solution material is scattered in the tank with a shovel; when it has been agitated and dissolved, the tank is filled to its operating level with tap water. The cleaner solution is continuously agitated with air during the time of immersion. Agitation is stopped, and the surface is skimmed just before the loaded parts basket is withdrawn from the cleaner.

When the cleaner solution has been thoroughly drained from the aluminum-alloy parts, the loaded basket is immersed for three minutes in clean warm water at a temperature of 140F±10F. The water is agitated by air throughout the time of immersion, and the surface is skimmed before the basket is withdrawn.

Oxide Removal

After the water has been completely drained from the parts, the loaded basket is immeresd in a chemical oxide-remover solution for a period of 20 to 25 minutes at room temperature or 5 to 10 minutes at 110F to 120F. This is followed by another period of draining, a three-minute rinse in cold water (room temperature), and a one-minute rinse in warm water, 140F±10F. Excess or trapped water is removed from the parts with an air blow gun, and a final drying is achieved by placing the basket in a hot-air drying cabinet for a minimum period of 10 minutes.

The chemical oxide remover (Fig. 2) is prepared by adding to a tank ⅔ full of tap water a phosphoric-acid solution prepared by first dissolving 43.7 lb of a proprietary compound in 80 gallons of water (9 ounces per gallon) and then adding 20 gallons of another proprietary solution (20% of the total). When these materials have been completely dissolved, the tank is filled to its operating level with tap water.

The preparations of all solutions for the chemical process are carefully supervised by the process engineering laboratory. Semiweekly tests are made to check the conditions of the solution and rinse tanks. The materials are added to the solutions at times when no production parts are in the tanks.

Mechanical Cleaning

The mechanical method of oxide removal is accomplished by wire brushing (Fig. 3). This method is used on parts which would be damaged by immersion in chemical solutions, parts which require minor spot weld repairs, parts which do not respond to the chemical solutions, and the previously mentioned structural parts. The brushing is accomplished by means of a rotary brush having an outside diameter of 4 in. (when new) and rotating at 3,400 to 4,000 rpm. Each steel wire is 0.003 in. in diam.

Prior to the brushing process, the parts are thoroughly degreased. If structural parts are involved, the chemical surface treatment may precede the wire brushing. The wire brush is applied lightly to provide a smooth finish and to remove the oxide film without gouging the cladding or parent metal.

Test Methods

The surface resistance of the parts processed for spot welding is evaluated by measuring the overall resistance of two production parts or test coupons on special laboratory resistance checking equipment. Because of the nature of such equipment, the resistance readings cannot be compared with Rensselaer Polytechnic Institute test results; if they are to be acceptable, they must be less than 0.0003 ohms. Visual inspection of surface-prepared parts should show no soil or stain which will interfere with good spot welding.

High surface resistance readings or visual indications of soil or stain on parts may indicate that the cleaner or oxide-remover solutions are out of control. In such a case, the process engineering laboratory determines by tests what corrective measures are necessary.

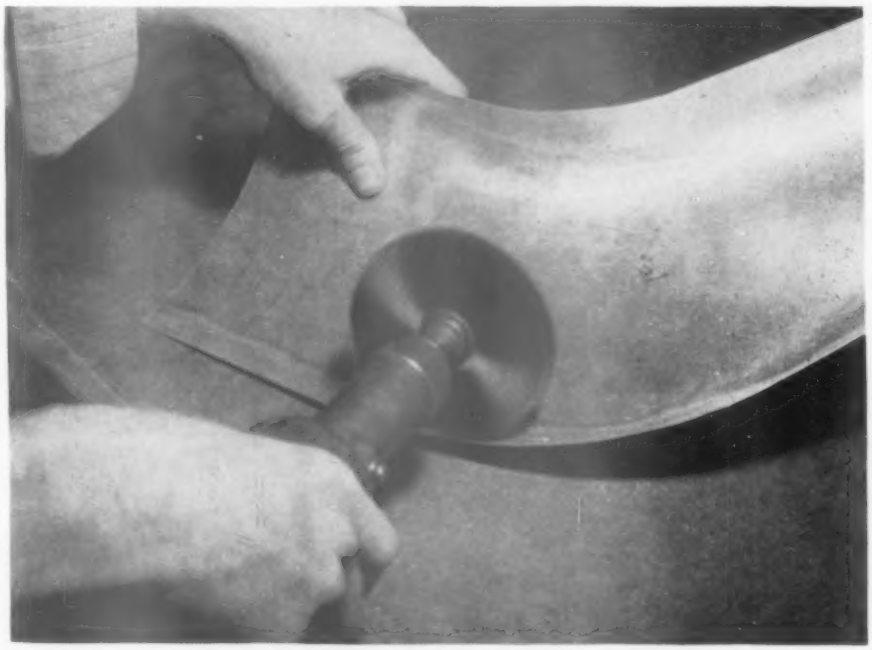


Fig. 3—A wire brush is employed to remove foreign oxide which the standard etch solution cannot clean off. The brush has an outside diameter of 4 in., rotates at 3,400 to 4,000 rpm. It is applied to the part lightly to prevent gouging of the cladding or parent metal.

★ PRODUCTION

Flame-Cutting Guide

Can shape flame-cutting be done with a portable machine? "No," say the experts; "Yes," say the men who designed the attachment that would let the machine follow a template.

By **R. P. MONROE**

Photos courtesy, National Cylinder Gas Co.

Fig. 1—Close-up of flame-cutting machine showing the rack bar, universal joints and the cross tie. Note the roller bearings mounted below the tie bar.

THE Basen Steel Works, Houston, Tex., secured a rush defense contract to cut a large quantity of alloy-steel channels to a tolerance of 1/32 in. The fly in the ointment was that the use of a shape-cutting machine was required, and delivery of such a machine could not be given for several months.

Designed a Gadget

Necessity mothered invention as it is proverbially reputed to do. The Texas firm put its ingenuity to work and with the assistance of a welding service engineer designed and fitted a shop-made attachment to its existing portable cutting machine. This little gadget handled the job with speed and efficiency. Before giving more details about it, however, let's look at the nature of the particular problem.

The channels were approximately four feet long and were to be cut in pairs, one left and one right. The face of the flange was tapered by machining prior to cutting, the taper ranging from 1/4 in. at the ends to 1/2 in. at the center of the channels. Hence the problem was to machine cut unequal thicknesses at different angles.

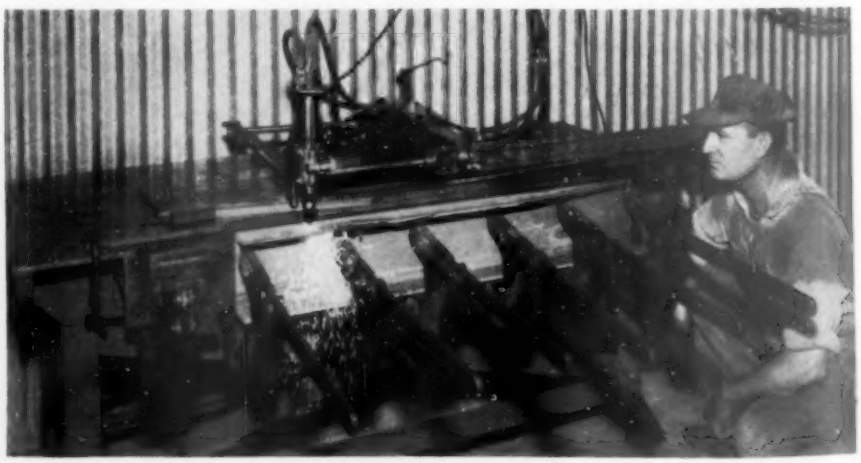
The accompanying pictures show how the portable cutting machine was fitted with a special assembly to do this job. As may be seen from Fig. 1, an extension rack bar was added, and one end of a universal joint was attached to each end of the rack bar. The other ends of the universal joints were then fitted with short pieces of bar stock steel, which were bolted together with a cross tie bar. The torch holder was attached at one end of the tie bar, and a roller-bearing guide wheel was also mounted upon it. Two more roller bearing rollers were added to this assembly—one to support the weight of the attachment and cutting torch and the other, attached with spring tension, to follow along a predetermined pattern or template, as shown in Fig. 2.

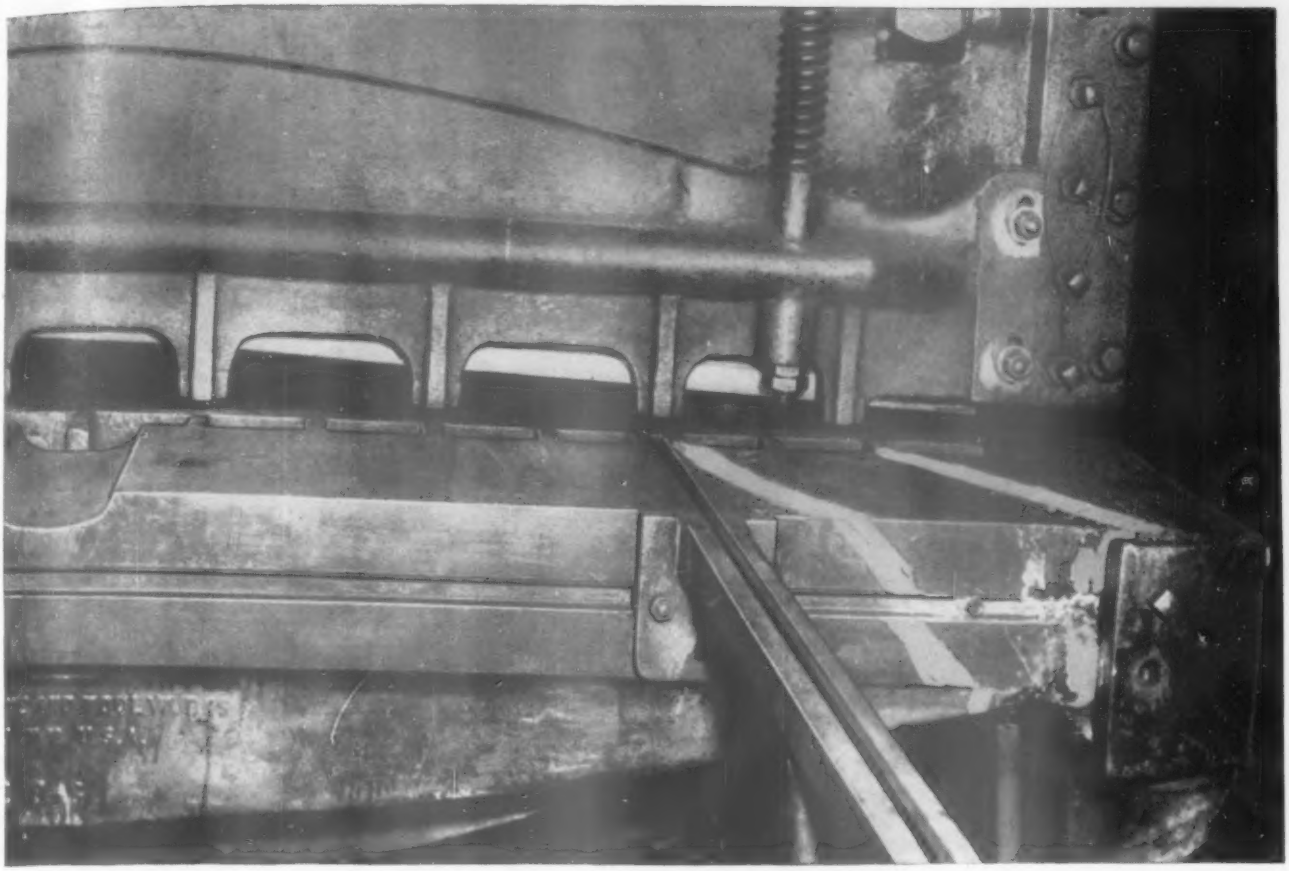
Automatic Adjustment

The bearing wheel supporting the weight of the torch also serves to raise and lower it automatically in order to maintain an equal distance between the tip and the work. The faces of the templates were machined to a taper at each end to correspond with the variation in thickness of the channels to be cut. While the thinner end of the channel was being cut, the torch traveled in a diagonal pattern and, therefore, actually traveled faster than the machine. When the heavier part of the flange was cut, the torch traveled at the same speed as the machine. This arrangement made it possible to use the same machine speed and gas pressure throughout the entire cut.

After a few test cuts, quick-acting clamps were fitted to the cutting table to expedite the work. Precision cuts could then be made within the allowable tolerance with speed and efficiency.

Fig. 2—Cutting the channel. The rollers follow a predetermined template to guide the torch. Quick-acting clamps facilitate the removal and insertion of the work.





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The danger of weldor's flash is greatest when several weldors are working in close proximity as in this picture. For the sake of each other and of non-weldor workers, each weldor should be segregated by curtains, screens or a welding booth. If this is not possible, care must be taken to see that each welding helmet is and remains lightproof.

Weldor's Flash— Its Causes and Cure

The presence of large numbers of weldors in shipbuilding and other war industries has created a comparatively new industrial hazard—weldor's flash. Mr. Wright tells what it is, what causes it and what weldors can do about it.

By **JOSEPH S. WRIGHT**

For the protection of the weldor and those who must work close to him, certain fundamentals of the nature of the electric arc must be fully understood.

Rays—Harmless and Harmful

Three different classes of rays are produced in the electric arc: (1) infrared, (2) visible and (3) ultraviolet. No other type of ray than these is present. There definitely are no X-rays present, so the rumor that the arc can cause sterility is wholly baseless.

Of the three rays that are present, infrared and visible rays are relatively harmless. Ultraviolet rays, however, are a different story since they are directly responsible for the prevalence of a new industrial hazard—weldor's flash.

Weldor's flash is caused by exposure of the unprotected eyes to the ultraviolet rays of the arc. The reflection of the arc can be nearly as dangerous to eyes as the arc itself since ultraviolet rays are reflected from white, smooth walls exactly as visible light is reflected. The danger of weldor's flash can exist as far as fifty feet from the arc.

The Symptoms

The first effect of weldor's flash is that the eyes seem tired. Later—at any time within 24 hours—a painful sensation develops suddenly, and it seems as if the eyes were filled with sand. This may happen while the victim is at home eating supper or as he is about to go to bed or in the middle of his sleep—so that he awakes to find his eyes aching as if filled with sand. Perhaps the sensation may even be postponed until morning, just as he is about to go back to work.

If the flash is very extreme, the man may find it practically impossible to open his eyelids; the least flicker of light becomes unbearable; in extreme cases, temporary blindness may occur.

Unfortunately, few doctors with a general practice are familiar with the symptoms of weldor's flash. If a victim calls in a doctor and does not inform him of the cause of his trouble, it is possible that the doctor may incorrectly diagnose the case and so scare the patient still more.

Treatment Is Simple

Weldor's flash, no matter how painful, is only temporary and will pass away by itself, even if not treated. Cases of extreme eye injury may result if a person, ignorant of the effects, exposes his unprotected eyes to the arc for a long period, but these cases are very rare because most industrial workers have an instinctive knowledge that the brilliant arc is not good for their eyes.

The following treatment is generally used by persons suffering from weldor's flash:

(1) A few drops of castor oil are put into each eye.

(2) Cold compresses may be applied.

Having done these two things, the best thing for the victim is to go to sleep. If the eyes are still sore on the next day, he should wear dark sun

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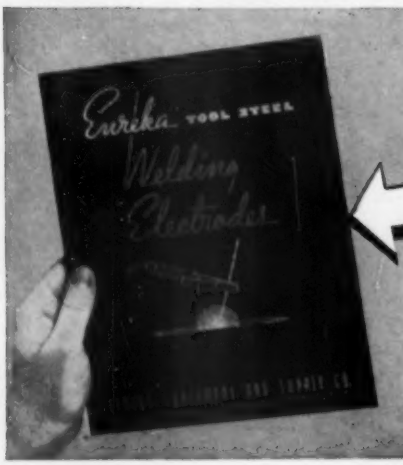

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This manual will help you save man-hours, conserve material and minimize production delays by outlining methods of repairing and compositely fabricating tools and dies, as well as correcting design and rectifying errors. Send for your copy today. It is fully illustrated with typical welding applications.

glasses until all soreness is gone.

Proper Protection

Electric arc welding need not be any strain upon the eyes. I have been arc welding for over thirteen years, for instance, and I do not have to wear any kind of corrective glasses. There is no doubt, however, that proper care must be taken, and in this connection I should like to make a few recommendations on the complete protection of the eyes:

(1) The weldor should check the inside of the welding helmet to see that no blue light enters from below the shield or from cracks. Where blue light can enter, so can ultraviolet rays. Needless to say, any holes or cuts in the helmet should immediately be repaired. Light leaks around the dark welding glass can be stopped by putting black friction tape around the glass, while light that enters from below the helmet can be stopped by wrapping a piece of chamois cloth around the chin strap.

(2) The proper shade of glass should be used for the work—one neither too light nor too dark. (The popular welding shades are Nos. 10, 11 and 12.) Too light a shade enables the brilliant light to dazzle the eyes and tire them, but with too dark a shade the weldor will have to strain to see what he is doing.

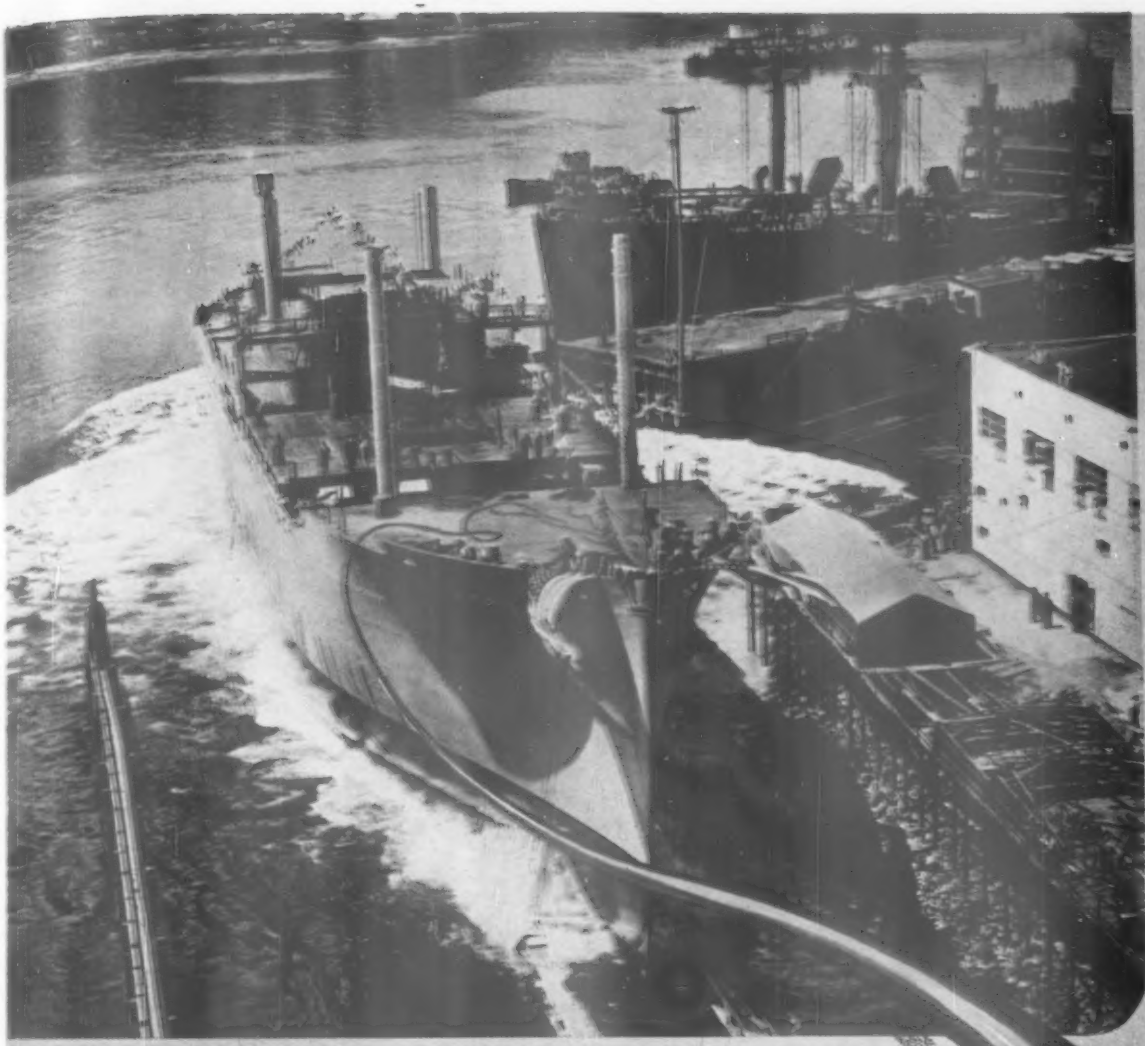
(3) To protect the eyes of the other workmen, the weldor should surround his work with a shield wherever possible.

(4) Persons working near a weldor are urged to use flash goggles. These are merely a good grade of sun glasses with side shields.

(5) When the weldor is working in such a place that his own eyes are exposed to the arc flash of other weldors, it is a good policy to wear a pair of clear rest glasses. Ordinary clear glass lets through the infrared rays and the brilliant visible rays but completely shuts out the injurious ultraviolet rays.

Non-Weldor Workers

Practically speaking, members of the allied trades working with weldors are in greater danger of weldor's flash than the weldor himself. Fear of the unknown may also add greatly to the suffering of these victims. For when the flash develops, many workmen forget that they were near arc welding and do not associate their intense pain with exposure to the arc. It is therefore ethical (and the decent thing to do) to warn a workman who has carelessly exposed his eyes that there will be danger of weldor's flash and instruct him how to treat his eyes should the flash develop.



Oregon Shipbuilding launching of the first AP5 combat troop transport built in the U. S.

WELDING helped speed the first AP5 troop transport down the ways

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Belden welding cable is used in shipbuilding operations from laying the keel to the final outfitting.

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Volts for Vertical Welding

Most authorities are in agreement that high open-circuit voltages should be used to do vertical welding, but few will say why. This author gives a concise explanation of the various factors involved.

By **CHARLES P. KELLY**

THE manipulation of the arc in the puddle is the very heart of arc welding. In vertical welding, three principal manipulations of the arc are used for control of the molten metal. The first and probably the most important is whipping or flagging, that is the throwing of the arc forward, out of the molten puddle, for an instant, thus permitting the puddle to cool slightly before additional metal is deposited in it. In this rapid throwing of the arc forward and back, it is neither easy nor desirable to maintain a short arc length, that is a low arc voltage. On the contrary, high open-circuit voltage is helpful in that it permits the needed temporary lengthening of the arc without danger of extinguishing it.

Choking the Arc

The second of these manipulations, choking the arc, is the shortening of the arc until it is almost extinguished, or even (for an instant) completely extinguished. High open-circuit voltage helps in this manipulation because it minimizes the increase of amperage as the arc is shortened, thus preventing an increase in the force of the arc stream. Such an increase would tend to blow the hot metal out of the puddle and so defeat the object of the arc choking, which is to hold the deposited metal in place by permitting it to cool slightly.

W. R. Stunkard in his recently published instruction manual, "The Instructor of Steel Arc Welding," advises the use of high open-circuit voltage for vertical welding in combination with a relatively low amperage setting. By way of illustration he compares the effect of this combination to that of a high water pressure acting through a small water pipe, giving a forceful and easily directed stream. Though this is a very good illustration of the apparent action of the arc stream, the driving effect can not be due to high open-circuit voltage of the welding current since this voltage automatically drops to that required by the length of the arc, regardless of the open-circuit setting.

To understand the cause of this apparently more forceful arc stream, it is necessary to recall that a high open-circuit voltage gives the welding generator a steep volt-ampere curve. Hence the ampere output varies much less with the lengthening and shortening of the arc than it would if the open-circuit voltage were lower and the volt-ampere curve were flatter. In other words, a high open-circuit voltage tends to make the ampere output more constant.

Uniform Melting Rate

An article by C. H. Jennings and A. B. White of the Westinghouse research laboratories in *Iron Age*, August 20, 1944, states: "The melting rate [of the electrode] is nearly proportional to the arc current [amperes] and largely independent of the voltage." From this it would appear that the practical effect of a high open-circuit voltage with its relatively constant ampere output is to produce an approximately constant melting rate in the electrode.

Observation of the welding arc in practical operation has convinced the author that the force with which the molten metal (with its accompanying partial vaporization and gases from the rod coating) is projected is largely determined by the melting rate. If this is true, then we can say that a high open-circuit voltage, since it is accompanied by constant amperage and resulting uniform melting rate, will give a stream of molten metal which changes its force only very slightly with changes in arc length. In other words, the force of the stream does not materially decrease when the arc is lengthened, nor does it increase very much when the arc is shortened.

Thinking of the arc stream as composed of molten steel particles and heated gases, it is to be noted that the force of the stream is not primarily, if at all, due to electrical action. The force is almost entirely a result of the production of gases in the intense heat generated by the voltage drop which occurs as the current leaves the end of the rod, whether this be anode or cathode in d-c welding or a rapid alternation of the two in a-c welding.

Long-Arc Technique

Now, bearing in mind the stabilizing effect which a high open-circuit voltage with its uniform amperage and uniform melting rate has on the force of the arc stream, we are ready to consider the third device for controlling the molten metal on a vertical surface—a technique which up to now seems to have received little attention in arc-welding instruction. The third method of manipulation is the use of a comparatively long arc, and its effect is to spread the arc heat over a larger area, so that only the surface of the base metal is melted, and also to spread the molten metal from the rod over a larger area and consequently in a thinner layer. In this way the amount of molten metal is kept small enough in any one spot so that it is effectively held against gravity by surface tension. Because of the length of the arc, the freshly deposited metal is not displaced by the blast of molten metal and gases issuing from the end of the rod. When the force of the arc stream remains constant, this spreading of the heat and placing of the metal is comparatively easy. It becomes difficult, however, when the force of the arc stream varies and the rate of deposit also varies, as they would do with lower open-circuit voltage. The third technique of control, therefore, also requires high open-circuit voltage.

Summing up these conclusions regarding the three techniques, it is evident that whether we prefer to control the molten metal by whipping, by choking the arc, by the plastering action of a long arc or by a combination of all these devices, a high open-circuit voltage is a distinct aid.

Flat Position Different

It may help to clarify these ideas if we consider the contrasting conditions prevailing in flat-position welding. Here deep penetration is often essential, and there is seldom any problem of holding the molten metal in place. Under these conditions, it is ordinarily best to use a low open-circuit voltage since this makes it possible to use a short arc, both to increase the force of the arc stream and also to concentrate its effect. The short arc serves to sweep the molten metal backward into the bead and produces a marked digging in action on the base metal. At the same time, it increases the amperes and so speeds up the melting rate of the rod. Thus a low open-circuit voltage can give us both a fast welding rate and deep penetration.

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On the Job

Spot Welding Naval Ordnance

AMONG the early installations of storage-battery-operated spot welders, the machine illustrated here turns out fluted structural steel ordnance sections for the Navy, 20 hours a day, at a rate of 1,440 spot welds per hr to join ⅛ in. to ⅛ in. thick sections.

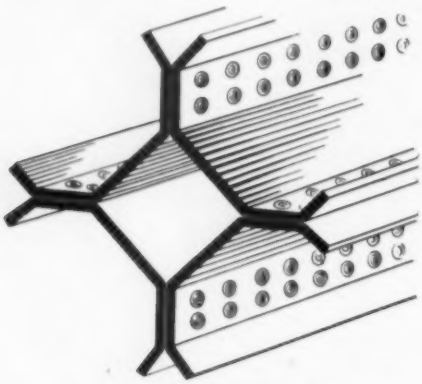


Fig. 1—Sketch of Naval ordnance structural sections as spot welded. Each section is of ⅛ in. steel.

The battery-operated machine was installed in a plant which did not have sufficient power available to operate the 150 kva (minimum demand) required by a spot welder of a more conventional type. The battery charger, operated continuously, has a maximum three-phase draw of only 27.7 kva. The twelve battery cells are kept charged automatically and require little servicing other than added water about once every three weeks.

The parts being welded (Fig. 1) are arc-tacked before coming to the spot welder. To facilitate handling, the work is mounted in a swiveling quick-clamp fixture suspended through springs from an overhead monorail as shown in Fig. 2. The operator loads the part onto the fixture, slides it into position for the first weld and steps on the treadle control to start operation of the timer (shown at the left of picture above the charger cabinet). The weld-cycle repeats automatically and continues as long as the operator keeps pressure on the treadle. The timer allows sufficient interval between welds to shift to the next position—a matter of ¼ second. The welding time for a spot is approximately ½ second.

On completion of all spots on one web, the assembly is flipped 90 deg in the fixture in order to weld the next web. Some 240 spot welds are required to finish one assembly. Output is approximately six units per hour, equivalent to some 29,000 welds daily.

The batteries are located in the base of the welder in place of the conventional transformer. The welder itself is of the rocker-arm type. The amount of current is controlled by the pressure between two carbon discs in the air-actuated contactor-controller. The greater the pressure, the lesser resistance and hence the greater the current that is allowed to flow. When the pressure is removed, the current stops flowing entirely. The carbon discs separate without arcing, even though a welding current of around 20,000 amp is handled.

Another unusual feature of this installation is that no compensation is required for induction losses. Since direct current is used for welding, the amount of stock in the throat of the welder has little effect on welding current.

Courtesy, Progressive Welder Co.

Fig. 2—Battery-operated spot welder for welding the fluted sections depicted in Fig. 1. The work is suspended from a monorail at approximate welding height. Operation of the welder is continuous and automatic once the foot treadle has been pressed.

» «

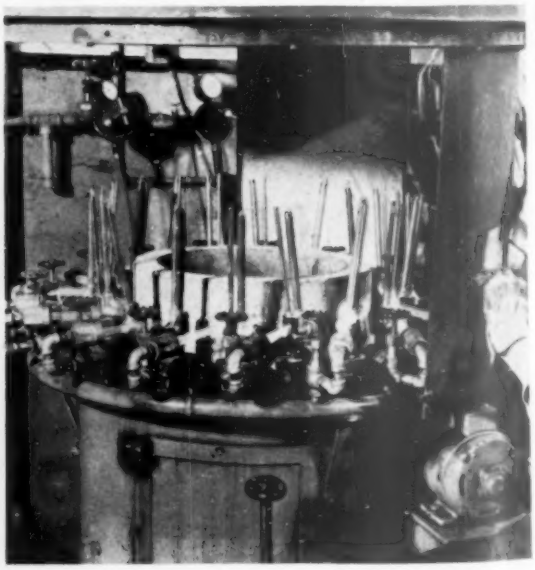
Silver-Soldering Machine

By W. L. Ulmer

UNIFORM and controlled heating of the workpieces in silver-soldering operations is accomplished by the use of a rotating work table in the plant of the Smith Welding Equipment Corp., Minneapolis. The machine is operated by two electric motors. A variable-speed motor operates the turntable, which passes the pieces to be silver soldered through the various flames. The second motor rotates the pieces at a fixed constant speed in the holders so that they are heated uniformly all the way around. Adjustment of the turntable speed provides for a uniform and gradual rate of heating to the soldering temperature. The flux is thus brought to the right temperature at the right time.

The accompanying picture shows tubes being soldered into the heads of Smith cutting-torch assemblies. One of the inserted tubes encloses a smaller tube which carries the oxygen for the preheating flame. The small tube is screwed into the head, and a small ring of silver solder is fitted around where the joint is going to be. The joint is fluxed with solder flux, and the outer tube is screwed into place. The same

The turntable is driven counterclockwise by a variable-speed motor while silver soldering is being done by the operator seated at the right. Another operator, standing, removes the soldered piece and puts an unsoldered assembly in its place.



Courtesy, Superior Flux Co.

procedure is followed when the tubes are soldered into the butt, except that the tubes are not screwed but pressed into place. The silver solder in the form of a wire is fed continuously by hand to the two outside joints, while the inner joint is heated by conduction and is thus automatically soldered.

The preheating-oxygen tube is of copper, and the larger outer tube is of Monel or drawn brass. The oxygen tube at the top of the cutting assembly is of drawn brass, and the heads and butts are bronze forgings.

» «

Welded Service Ladder

By Charles C. Lynde

AN OILWELL drilling contractor, employing a battery of portable boilers to furnish power for his operations, provided a light, portable and safe ladder for the use of the firemen compelled to mount to the

Welded ladder to service portable oilfield boilers. Neither uprights nor rounds can absorb enough heat (even from a bare boiler) to constitute a hazard to firemen.

tops of the boilers in order to service safety valves.

This ladder was made by welding sections of extra-heavy 1 in. pipe into the shape of an inverted pyramid or wedge having a platform at the top. Rounds of ¾ in. pipe were then welded to the uprights at the proper spacing for easy mounting. The top platform rests in two angle-iron side pieces, which were welded across the pipe risers. The wooden sections of the platform were bolted in place through holes cut through the flanges of the angles.

To insure footing even in sandy soil, the ladder was fitted with round bearing pads, which were attached parallel to the platform.

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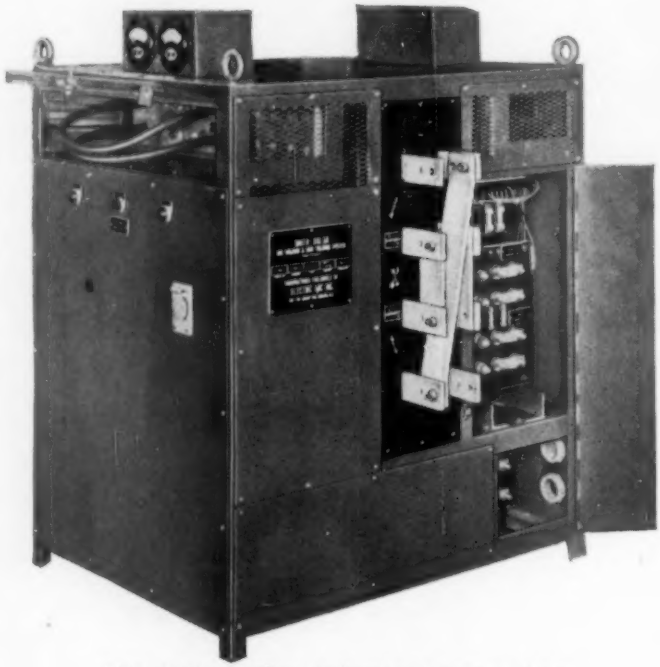

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Welded Pipe for Birdseye

By S. Craig Cairns

JUST outside Bridgeton, N. J., is located Seabrook Farms, the world's largest truck-farming enterprise but better known as the home of Birdseye frozen foods. The huge processing plant alone occupies 62 acres and handles not only Seabrook's entire production but also that of 500 additional farms stretching all the way from Cape May, N. J., to Lancaster, Pa.

Water for irrigation for Seabrook's

Courtesy, The Hobart Brothers Co

Welded pipe lines provide irrigation at the home of Birdseye frozen foods

12,000 acres was formerly distributed through wooden pipes—10 in. cedar pipes bound with steel wire. Cedar is, of course, remarkably impervious to the effects of moisture, but it is by no means eternal. When the wood pipes began to rot, causing a large loss of water, it was decided to replace them with welded 5 in. steel pipes.

All welding was done in the fields by means of a 300 amp gas-engine-driven arc welder mounted on steel wheels. Three lengths of 20 ft pipe were welded together and then lowered into the ditch, to be joined to the line already laid.

Seabrook also uses welding in its well-drilling operations. Lengths of casing are welded together, eliminating the use of threaded couplings.

» «

SUPER SHOULDER PADS. *For added protection against enemy shells, this 21/2 ton General Sherman tank turret is acquiring a 400 lb steel "shoulder pad" at the Warren City Mfg. Co. The Ohio subsidiary of Graham-Paige Motors Corp. is modifying scores of these Sherman turrets to meet new combat requirements.*

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—all of the other outstanding "Bumblebee" features.

● If you have jobs that can be done by a 200 ampere machine, it will pay you to know this new "Bumblebee". Ask your nearest Airco office for bulletin ADW62 or write Dept. WE, Air Reduction, General Offices: 60 East 42nd Street, New York 17, N. Y. In Texas: Magnolia Airco Gas Products Co., General Offices: Houston 1, Texas.

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Two range current control with precise, stepless adjustment of welding current to any value within each welding range is provided by easy-turning crank.

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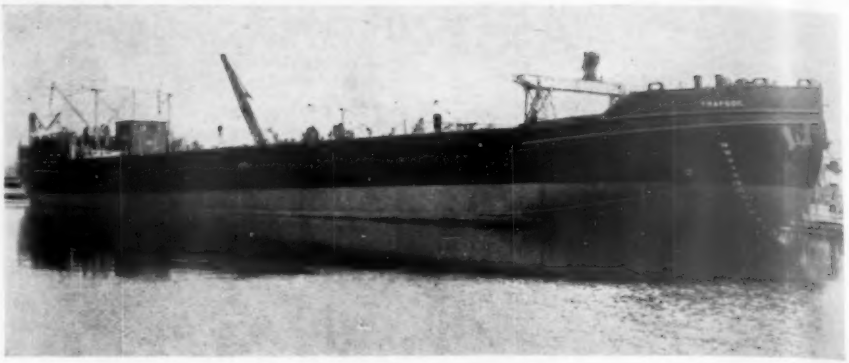
First All-Welded Tanker

THE first all-welded tanker ever built, the *Transoil*, took "a particularly important and dangerous part in the Normandy invasion," according to a report recently released by the American Merchant Marine Institute of New York. "The service of the *Transoil* and 43 other coastal ships was especially hazardous," the report pointed out, "because they were among the first vessels to touch the invasion beaches. The *Transoil* was especially suited for the front-line service of transporting oil—life blood of mechanized warfare—across the English Channel. It was also of particular value in supplying small ports in the British Isles and in reshipping cargo and munitions that had been brought across by larger vessels."



Built in 1936 at the Chickasaw yard (Mobile, Ala.) of Ingalls Shipbuilding Corp., this pioneer tanker has proved the worth of all-welded construction in invasion service.

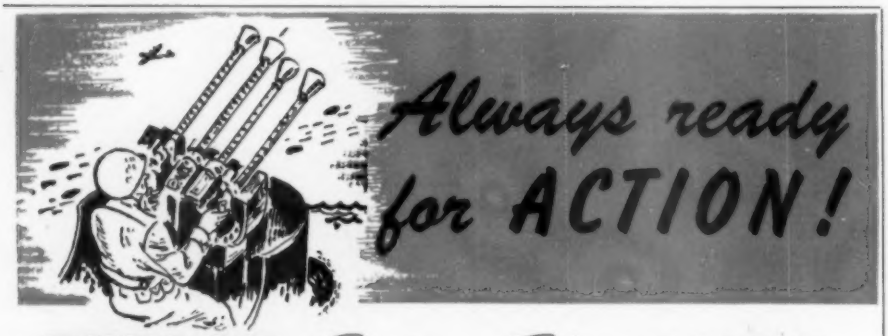
This ship has an overall length of 258 ft, a gross tonnage of 1,571 tons and a draft of 16½ ft. It was launched in 1936 by the Ingalls Shipbuilding Corp. at Mobile, Ala. Since then Ingalls has moved to its Pascagoula, Miss., shipyard and has built all-welded aircraft carriers, submarine and seaplane tenders, troopships, attack transports, cargo vessels and other 18,000 ton ships for war purposes.

» «

Simplified Electronic Control

AN ELECTRONIC system which will make possible more than 150 different combinations of resistance-welding control from eleven basic units has been developed by C. B. Stadum, resistance-welding engineer of the Westinghouse Electric and Mfg. Co. From the standard basic units, company executives explain, it will be possible to factory assemble welding controls that will meet the diversified needs of industry. At present, this can only be done through individually designed and custom-built controls.

T. R. Lawson, resistance-welding application manager for Westinghouse, uses planning models to demonstrate the ease and simplicity of building up any desired resistance-welding control.



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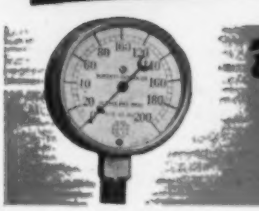

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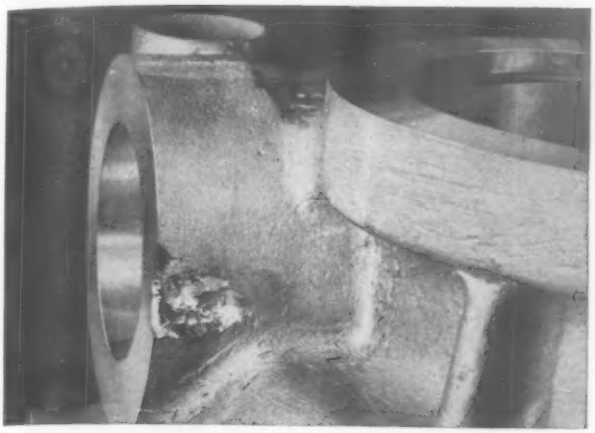
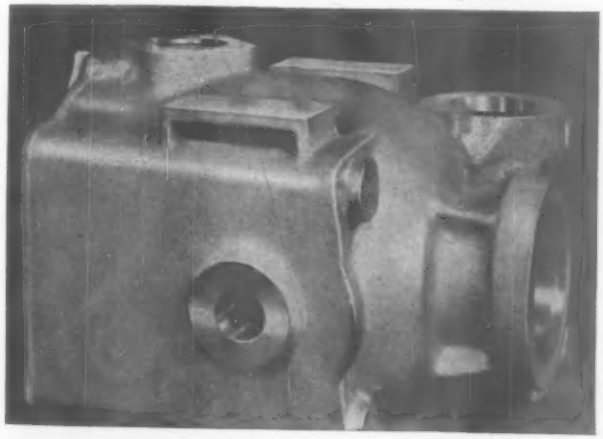


SURFACE DEFECTS on large bronze castings do not necessarily mean scrapping. This close-up shows how defects, in highly porous area, are chipped out for repair by carbon arc welding.

REPAIR WELD is here completed, with excess weld metal ground off. Chase Olympic Bronze Welding Rod was used because of density of weld metal resulting, and for closeness of color match.



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Short Cuts and Kinks...

All Out for Victory!

THIS blow-up of a page in a recent issue of THE WELDING ENGINEER was placed on all suggestion boards of the Philadelphia Navy Yard to give credit to Earl G. Johnson, whose idea for beveling armor plate was written up in "Short Cuts and Kinks." We are pleased that the P.N.Y. thinks so highly of the recognition Mr. Johnson received in THE WELDING ENGINEER.

You, too, can gain such recognition (and help the cause of victory) by contributing a brief description and photo of your own particular time- and labor-saving idea for allout production. Send anything you think suitable to: Editor, THE WELDING ENGINEER, 506 So. Wabash Ave., Chicago 5.

Stud Gun Bracket Tacker

By A. F. Furrer and M. E. Johnston

A LAYOUT MAN, a tacker and a helper were needed at Marinship, Sausalito, Calif., to tack weld cable brackets and hangers into place. Pondering over this waste of manpower, we devised a system whereby one man could do the entire job—with a stud-welding gun. We submitted the idea to the War Production Drive Committee, and as a result the yard is now using a modified stud-welding gun for bracket tacking.

The modification which makes this application possible consists of a clamp attached to the gun. The clamp holds the bracket to the underside of the deck or to any other surface to which it is to be tacked. After the bracket is positioned, it is only necessary to pull the trigger and the bracket is tacked into place by its own arc. The operator then releases the set screw from the welded bracket, and the gun is ready for another operation.

This simple suggestion eliminates both the tacker and the helper on every bracket-tacking operation. Since there are several thousand brackets on each ship, our suggestion is estimated to save 15 men ten days' work on each hull—about 12,000 man-hours per ship. The cost of the clamp which adapts the stud gun for this work is about $1.

Bracket-tacking stud gun. The attached clamp positions the bracket against the underside of the deck or other surface to which it is to be tacked.

» «

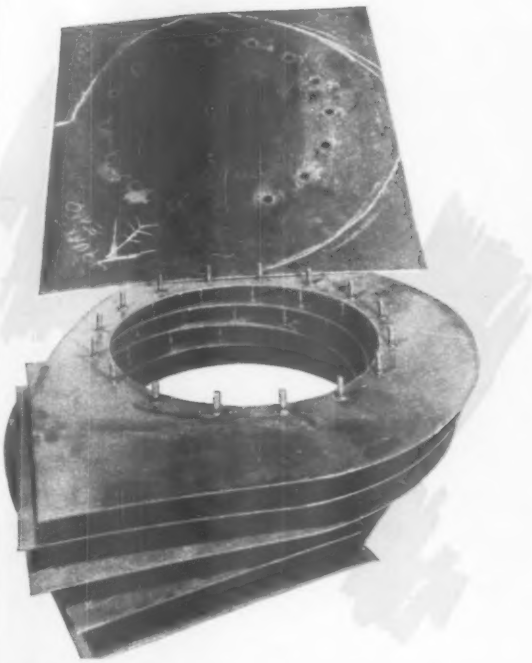
Pipe-Fabricating Table

By E. L. Hetrick

I CONTRIBUTED to the U. S. Navy Beneficial Suggestion program at the Puget Sound Navy Yard an idea for a set-up table which has considerably improved and speeded up the fabrication of pipe nipples, tees, ells and laterals. This table has metal holders for positioning the pipe preparatory to welding. The holders may be moved freely until the proper setting is obtained when they are locked into position by means of tee slot bolts and nuts. With the pipes thus properly positioned, tack-welding operations proceed.

The suggestion was adopted, and we are now using the new set-up table. It replaces wooden forms, which were formerly nailed together as needed, consuming considerable material and much time. By using the present method of placing the pipes in movable holders mounted on a table, a production increase of 200% has been realized. It is estimated that the use of this device will save $400 annually.

Table for setting up and aligning spools, tees, ells, etc. prior to tack welding. The slots permit ready adjustment of the pipe holders.

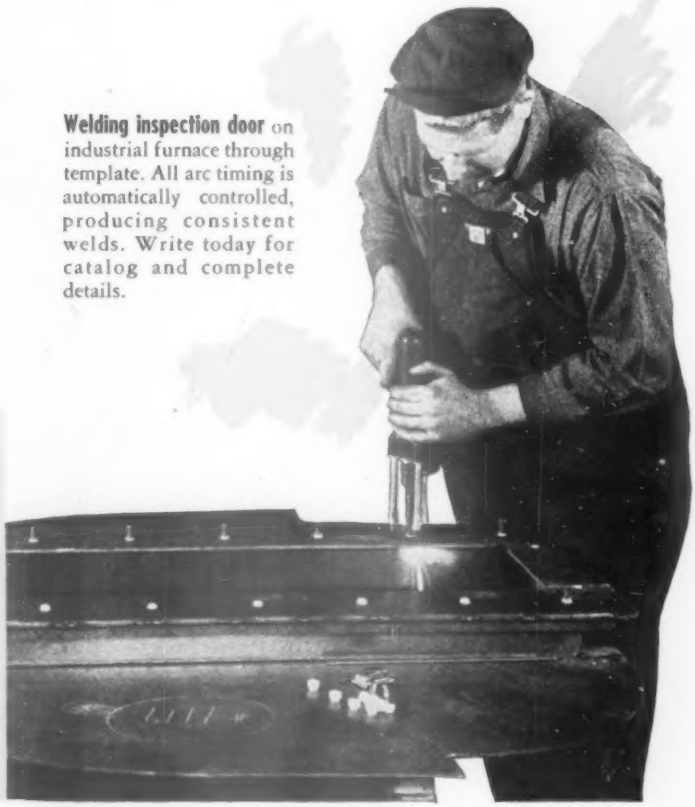


A template is used in welding studs to parts. Studs are welded through holes onto casing, insuring accuracy of spacing. Nelson Production Stud Welding Units, welders mounted on pneumatic cylinders and arbors, are also used where continuous production of parts is required.

Inspection plates of all kinds are welded in any position with the portable Nelson welder. Light in weight and easy to handle, it may be used efficiently in any location. Welds produced are as strong as any hand-welding method—have consistent weld fillets.

Welding inspection covers of all types is an ideal stud application. Studs are welded at desired centers to cover flange and cover secured with nuts. No holes in casing . . . close tolerances held.

Welding inspection door on industrial furnace through template. All arc timing is automatically controlled, producing consistent welds. Write today for catalog and complete details.

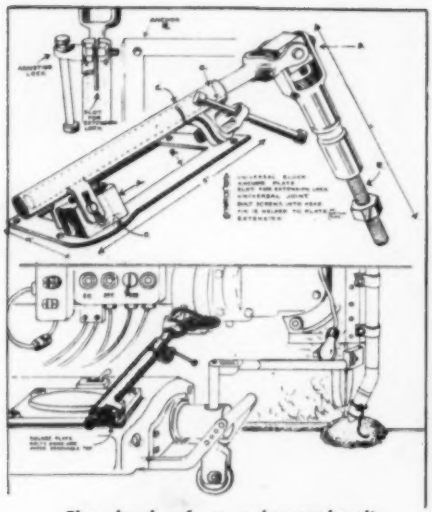


For catalog and prices write to

NELSON SPECIALTY WELDING EQUIPMENT CORP.

Dept. W, 440 Peralta Ave., San Leandro, Calif.

Eastern Representative: Camden Stud Welding Corp. Dept. 122, 1416 So. Sixth St., Camden, N. J.



The head of a submerged-melt welder is attached to a small universal joint on a telescopic bar.

Submerged-Melt Head Bracket

By W. G. Lussenden

A BRONZE bracket placed to the rear of the machine is used to hold the head of the submerged-melt welder used at the Kaiser Co. yard at Vancouver, Wash. We found that these bronze brackets were frequently broken because it took so much pressure to hold the welding head in this remote position. Every broken bracket meant that the machine had to be out of service until the bracket could be replaced.

Feeling that this weakness could be overcome, I submitted an idea to the War Production Drive Suggestion Committee. The suggestion, which was subsequently adopted, provides for the attachment of a small universal joint to a telescopic sliding bar. The bar is fastened both to the head and to the front of the machine, and a slight pressure applied through a set screw will hold the head tight. The universal joint allows the head to be moved in any direction, an impossibility when the bronze bracket was used. Hence the head is now much easier to adjust. Finally, we save an average of 160 man-hours per month by not having to hold up three workers while a submerged-melt welder is being repaired because of a broken bracket.

» «

Holding Tool

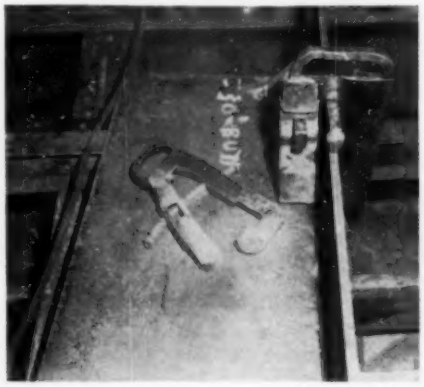
By S. D. Broadbent

COMMON practice in the welded fabrication of air ducts on an A-20 bomber was to place a sizing ring in a bench vise and squeeze the ducts together—a slow and awkward method. To speed up the operation, I suggested to the War Production Drive Committee at Douglas Aircraft, Santa Monica, Calif., the use of a sizing ring of a different type. The new sizing ring is easily operated, saves time and can be used by women employees very easily. The principle of this suggestion is applicable to a number of other jobs besides the operation of sizing air ducts. It may be used to hold almost any pair of tubular parts together to facilitate welding.

Web Frame Jig

By Lloyd J. Jenkins

IT IS common practice at Oregon Ship, Portland, and at other yards to draw the webs and flanges of ship floors and decks into proper alignment and relationship with saddles and wedges. After the



The clamp has a hinged jig to hold the flanges of the web frame in position for tack welding.

web and flange have been properly aligned (as determined by checking with a rule), the two pieces are tack welded together and the saddles are removed.

To improve this method of construction, I suggested to the War Production Drive Committee use of a clamp with a hinged jig designed to hold the flanges of the web frame into position for tack welding. The jig is hooked over the flanged section and clamped over the web section. One wedge is used to secure the jig on the web; another wedge is used to draw the flange to the web while a third wedge is used to force the flange into a 90 deg angle with the web. The flange and web are then tack welded together, and the operation is complete.

The use of this jig eliminates the tack welding of saddles—an operation which required the time of one weldor, one shipfitter and one chipper for a total of 1¼ man-hours per unit. My suggested system requires only a weldor and a shipfitter for a total of ½ man-hours per unit. This alone results in the saving of ¾ man-hours per unit or, since there are 79 units per boat, a total saving of 592½ man-hours per month. Another advantage is that the necessity of measuring the position of the flange in relation to the web on each individual web flange has been eliminated.

» «

Welding Jig

By Orval C. Anthony

MY JOB at Consolidated Steel Corp., Wilmington, Calif., was to weld terminal tubes to doubling plates. We used to place all of the terminals on the boxes and weld

Positioning jig to facilitate the welding of terminal tubes to doubling plates.

them in place. This meant that there was a lot of overhead and vertical welding.

To make the task easier, I submitted a suggestion to the Labor-Management Committee for a jig that would place all welding in the downhand position. It also made the work much more accessible.

The adoption of this adjustable jig for the welding of terminal tubes to doubling plates has saved us 150 man-hours per frigate.

This sizing ring was designed to insert inside flanges of an A-20 bomber air duct.

How to Determine the Length of a Roll

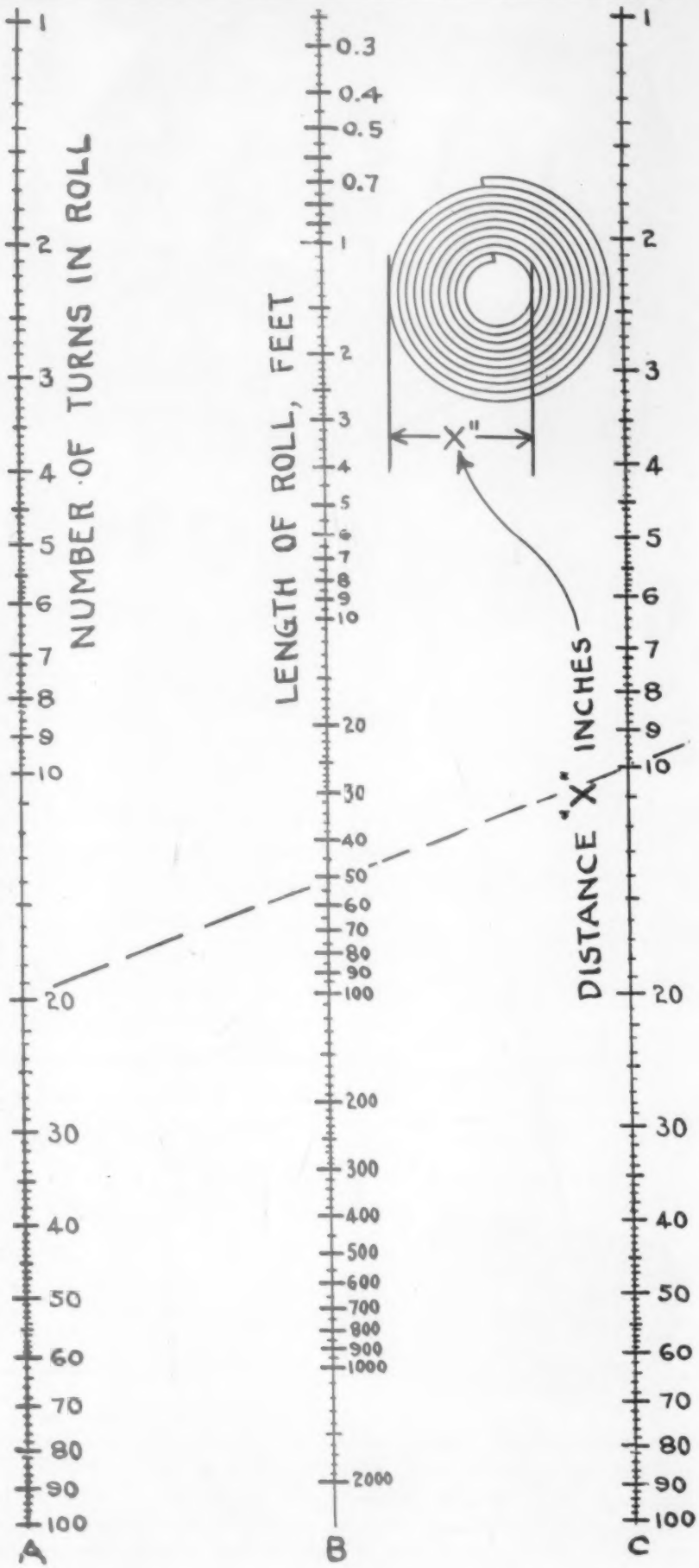
By W. F. SCHAPHORST, M. E.

USE THE NOMOGRAPH at the right to determine the number of feet of any material in a roll. The nomograph will give the answer regardless of the kind of material—it may be sheet metal, belting, paper, insulation, wire netting, cloth, etc. The material makes no difference so long as it is rolled.

The sketch (upper right corner of chart) shows how to measure the roll. The distance "X" must be measured in inches exactly as shown. This is the only measurement necessary, though you will also have to count the number of turns. The two figures, however, are all you need, for the chart is based upon a simpler formula than one usually given in the textbooks.

Example: How many feet of material in a roll having 20 turns and a distance "X" of 10 inches? The answer, approximately 52 ft, is found by drawing a line or laying a straight-edge from 20 in Column A to 10 in Column C and noting the intersection with the scale of Column B.

The range of this chart is great enough to cover easily any ordinary roll. Just lay a straight-edge across from known point to known point, and the intersection with the middle column will give the length (in feet) of the roll immediately. A little practice will soon make you proficient in the application of this chart to actual working problems.



GREAT STRENGTH—HIGH DUCTILITY

These Two Important Properties Are Joined in One Great Steel

There are many steels that offer high yield strength; there are others that provide good ductility. It is the combination of both desirable properties in N-A-X High-Tensile Steel that makes possible exceptional economies in the design and fabrication of stressed parts. N-A-X High-Tensile Steel is proving its worth in varied war equipment and in essential civilian products . . . bringing to manufacturers the advantages of easy cold-forming, excellent weldability, great strength, and high resistance to impact, wear and fatigue. It is one of America's most *useful* steels.

N-A-X ALLOY DIVISION

GREAT LAKES STEEL

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GREAT STEEL FROM GREAT LAKES

N-A-X 9100 SERIES STEELS for shallow or medium hardening requirements, and N-A-X X-9100 Series Steels (molybdenum-bearing) for depth hardening requirements, provide an all-purpose analysis to yield properties in both carburizing and constructional ranges of carbon.

N-A-X ARMORPLATE, used in practically every type of landing craft and in scores of combat vehicles, gives evidence of the strength and ruggedness that characterize N-A-X low-alloy steels.

★ PRODUCTION

Silver Brazing on Varied Work

A flexible production set-up enables each job at Midwest Brazing to be processed according to its special needs. The induction coil, the oxy-acetylene torch and the furnace are all employed.

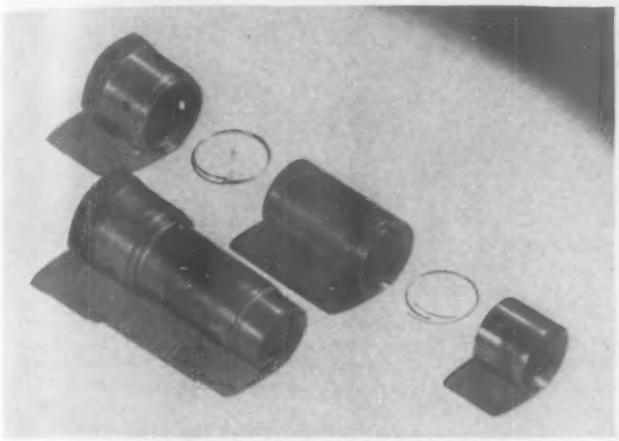


Fig. 1 — Spark plug shield assembly. In the background, left to right: nipple with the hexagonal end, brazing ring, short notched tube, second brazing ring and short nipple. In the foreground is a shield that has been assembled and brazed.

Courtesy, Handy & Harman

Fig. 3 (right)—The assembled elbows are placed in a furnace for brazing. The rack holds 56 elbows.

AN INTERESTING example of the wide applicability of silver brazing is furnished in the work being done by the Midwest Brazing and Engineering Co., Inc., Chicago, a jobbing or contract shop doing special jobs for other manufacturers and machine shops. Silver-brazing operations at this concern cover all types of work from the repair of tools and gauges in small odd lots of miscellaneous parts to substantial production runs. All brazing methods are employed: induction heating, furnace brazing and the oxy-acetylene torch.

Courtesy, Handy & Harman

Fig. 2—Brazing the spark plug shield by induction heating. An assembled shield is inserted in the coil, just under the operator's left hand.

The set-up of the plant is highly flexible, and each job is processed in accordance with its special needs. Conveyor systems and other large permanent installations are impracticable here because of the fluctuations in volume and the variations in the type of work handled.

Fairly typical of the jobs done at Midwest Brazing is the assembly of a spark plug shield for airplanes (Fig. 1). The assembly is made up of four parts: a short notched tube, a nipple with a hexagonal end, another short nipple and an elbow. The job is broken down into two stages: the attachment of the two nipples to the tube and the attachment of the elbows.

Induction Brazing

The tube is silver brazed to the two nipples by the induction-brazing process. The parts are first cleaned in a hot alkaline solution, and two silver-alloy rings are slipped into place —one on the top and the other on the bottom of the tube. These rings are 0.015 in. thick by ¾ in. diam. and 1/32 in. thick by 25/32 in. diam. The nipple with the hexagonal end is attached to one end of the tube and the short nipple to the other part of the tube. The attached parts are then dipped in flux to coat them all over.

The assembled shield is inserted in the induction coil, as shown in Fig. 2. The outfit is a home-made rig but highly effective. The brazing time is 17 seconds. The shield is air cooled to avoid embrittlement of the high-carbon steel and cleaned in a hot alkaline solution to remove the excess flux. It is then tested under water at an air pressure of 50 psi and coated with an oil rust-preventive.

Furnace Brazing

Furnace brazing is used to join the elbow. As before, the parts are cleaned in a hot alkaline solution and a silver-alloy ring, 0.20 in. thick by ½ in. diam. is slipped over each end. The elbow is assembled to the nipple and fluxed all over.

The parts are next placed in a special rack (Fig. 3), 56 elbows to the rack, and put into the furnace for 3 min, 15 sec. The furnace is fired with premixed city gas. Air cooling, cleaning, testing and coating with an oil rust-preventive are done as described above.

Oxy-Acetylene Brazing

Another part on which considerable brazing is required is a chassis for an electrical instrument. This part contains 5 studs, 1 nut, 2 seams and 4 bosses. Here oxy-acetylene torch brazing is used. The routine is as follows:

The chassis is dipped in acid to remove the oxide and scale, rinsed and painted with flux on all points to be brazed, using a brush. Brazing is then done, using 3/64 in. silver-alloy wire. As before, the chassis is cleaned in a hot alkaline solution to remove the excess flux and oxides and is covered with an oil rust-preventive.

New Products to Use

Air-Fed Helmet

★ To give weldors complete relief from obnoxious fumes, a new air-fed welding helmet was originated by the Pullman-Standard Car Mfg. Co. with the aid of the Northwestern University Medical School. After exhaustive tests in many large plants, this helmet was perfected by the Chicago Eye Shield Co., which is placing it on the market under the name, "Air-Flow" welding helmet.

The commercial product follows the original research design evolved by Pullman safety engineers and Northwestern University medics. Clean, fresh air is fed into the helmet through a supply tube encircling the lens holder. The directional flow of the fresh air prevents any stale or fume-laden air from entering the helmet; however, the flow is sufficiently gentle so that the worker's head is not in a draft, states manufacturer. **Chicago Eye Shield Co.**, 2300 Warren Blvd., Chicago Ill.

CESCO "Air-Flow" helmet. It gives weldors relief from obnoxious welding fumes.

» «

Hard-Facing Rod

★ "Fanweld" is a non-ferrous hard-facing rod containing tantalum-columbium carbide and intended for oxy-acetylene torch application to steel. The tantalum-columbium carbide is said to impart a self-lubricating action which minimizes the destructive effects of friction, even at elevated temperatures. Hence the hard-facing metal is well suited for hot-work punches, dies and tools.

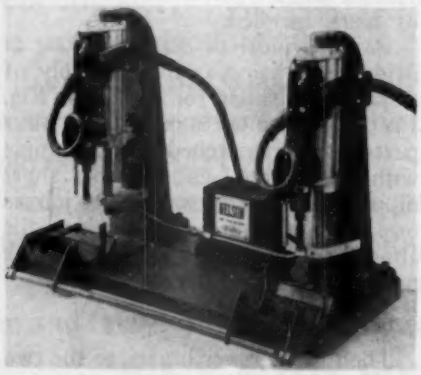
Properly applied, "Fanweld" wets steel surfaces without the use of a flux; surfaces as thin as 0.010 in. can be applied with a fusion layer as thin as 0.0005 in., says manufacturer. The rod is available in 1/8 and 1/4 in. diameters in 14 in. lengths. **Fansteel Metallurgical Corp.**, North Chicago, Ill.

Multiple Stud Welder

★ A new Nelson automatic stud welder has been developed to meet the requirements of mass production. Using this unit, two or more studs may be welded in one operation. The work is performed rapidly, and the studs can be held to very close tolerances.

Each welding gun is mounted on a pneumatic air cylinder, which is fixed to a movable arbor that can be adjusted to any spacing necessary. The work is held in a mandrel, chuck or special locating device as determined by the particular problem. The welding current is obtained from a conventional 400 amp generator and is regulated by a timing control unit. The timer automatically controls the length of arc flow, producing welds of consistent quality.

To operate, the work is inserted, a stud is fitted into the chuck of each welding gun, and the control switch is pressed. The first gun descends to make a weld, upon completion of which the next gun descends. The guns then ascend automatically, and the work is removed.



Nelson stud welder for mass production. When the control switch is pressed, the guns descend, weld and ascend automatically.

These units are manufactured only to order to fit a particular production problem. Further details can be obtained from **Nelson Specialty Welding Equipment Corp.**, 440 Peralta Ave., San Leandro, Calif.

» «

Cleansing Cream

★ "Den-Nex" is a new cleansing cream used for removing lacquer, paints or other tenacious substances such as enamels, airplane dopes, varnish, resin solutions, synthetic adhesives, inks and dyes. The cream is used after, not before, work. **Dennis Chemical Co.**, 2701 Papin St., St. Louis 3.

Indexing work carrier for high-frequency induction brazing. The coils are located under three of the work stations, immediately adjacent to the automatic ejector.

Induction-Brazing Unit

★ The accompanying illustration shows a 24 station circular indexing carrier mounted on an 18 kw electronic high-frequency generator in order to braze metal assemblies. A complete assembly is ejected from the carrier each 12 seconds, and the operator needs only to load the stations as they come around empty. Heat is applied by a set of three water-cooled induction coils located under three of the work positions; normal frequencies range from 200 to 600 kc. The vertically-operated ejecting mechanism follows immediately behind the coils. Carrier drive is by a small motor.

The above carrier can be applied to any of the company's electronic generators with ratings of 5 to 100 kw. **Scientific Electric**, 107-119 Monroe St., Garfield, N. J.

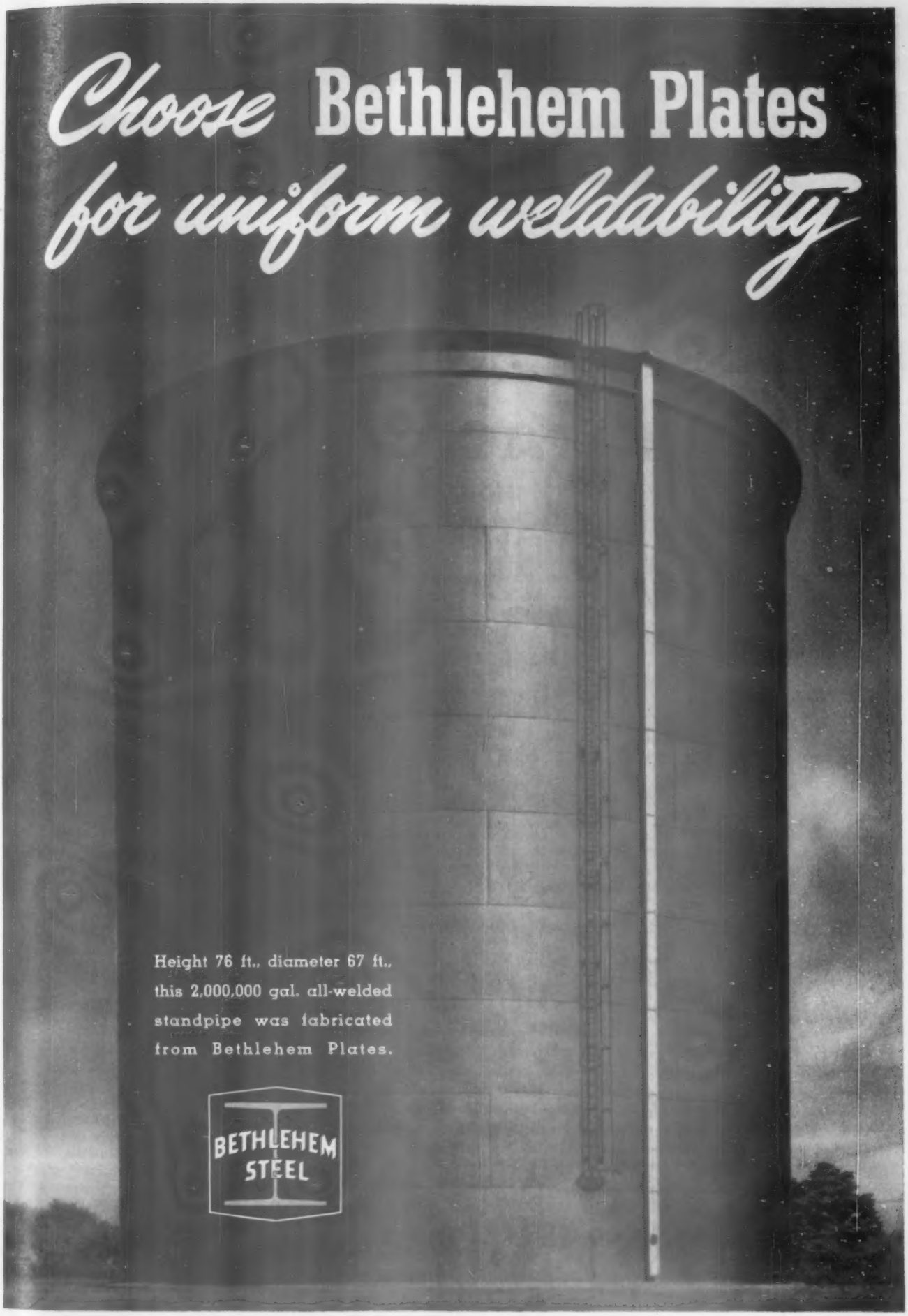
» «

All-Position Electrode

★ "Fleetweld 47" is a new shielded-arc electrode for general-purpose welding of mild steel. It conforms to AWS classifications E-6012 and E-6013 and can be used for either a-c or d-c welding in any position. It is said to be especially well suited to the making of high-speed horizontal or flat fillet welds over 4 in. long and can also be used for vertical and overhead fillets, especially where large single-pass fillets are desired. Because of its ease of slag removal, this electrode is excellent for square-edge butt joints; complete penetration of a 1/4 in. plate can be obtained by welding one pass from each side.

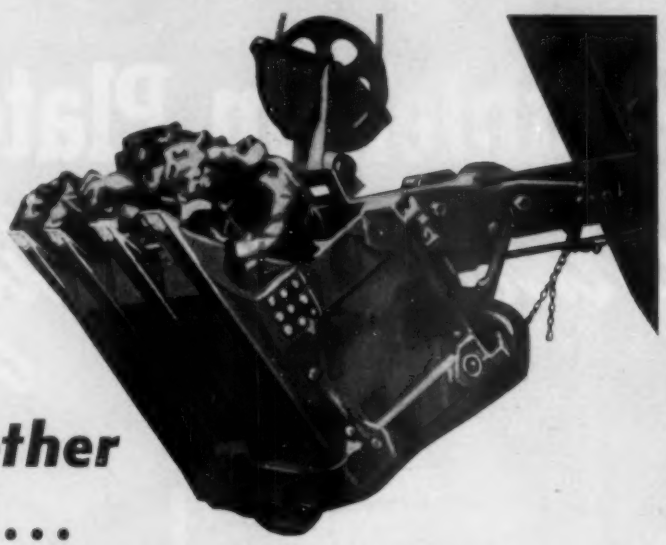
"Fleetweld 47" is available in four sizes; 3/32 by 14 in., 1/8 by 14 in., 1/4 by 18 in. and 5/32 by 18 in. **The Lincoln Electric Co.**, Cleveland 1.

Choose Bethlehem Plates *for uniform weldability*



Height 76 ft., diameter 67 ft., this 2,000,000 gal. all-welded standpipe was fabricated from Bethlehem Plates.

BETHLEHEM STEEL

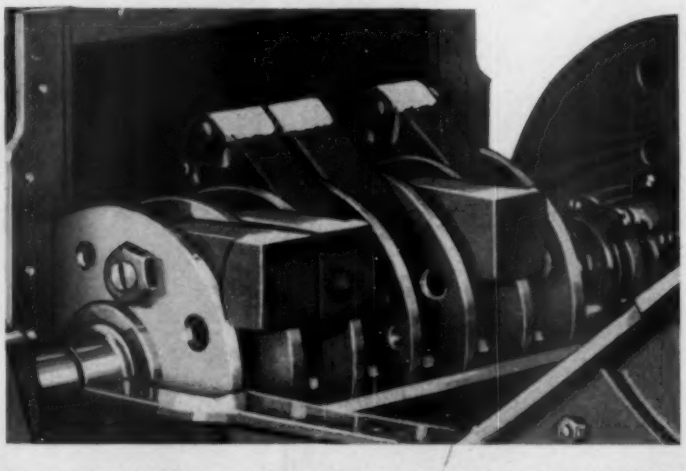


Whether You...

HARDFACE

POWER SHOVEL TEETH

To prevent excessive wear or to make them last longer, dig more aggregate faster and fill buckets quicker and easier,



OR REBUILD HAMMER MILL HAMMERS

To make them break more material to size quicker, whether the substance you are crushing is rock, sand, minerals or food stuffs,

OR JUST REFACE A PLOWSHARE

So that it will turn more acreage of soil faster and use less horsepower with less expenditure and refitting. You will be smart and reduce your costs if you specify RESISTO-LOY Hardfacing and ISOROD Self-Hardening ALLOYS for your maintenance problems. Both alloys can be deposited by A.C. and D.C. Welders or by Oxy-Acetylene.

RESISTO-LOY COMPANY

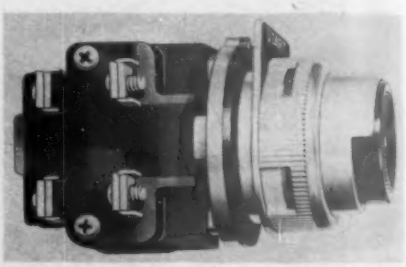
GRAND RAPIDS (7) MICHIGAN

Lyon-Raymond hydraulic elevating table with telescopic towing handle.

Hydraulic Elevating Table

★ A telescopic towing handle has been added as an optional feature to the Lyon-Raymond hydraulic elevating table. Extended, the handle provides a means for hauling the table from place to place; collapsed, it is out of the way below and under the table top. Other optional features on this elevating table are a two-speed pump, retaining bars, a removable roller top and an indexing device. **Lyon-Raymond Corp., 2154 Madison St. Greene, N. Y.**

» «



Square D Type T pushbutton for group mounting on machinery or control enclosures.

Oiltight Pushbuttons

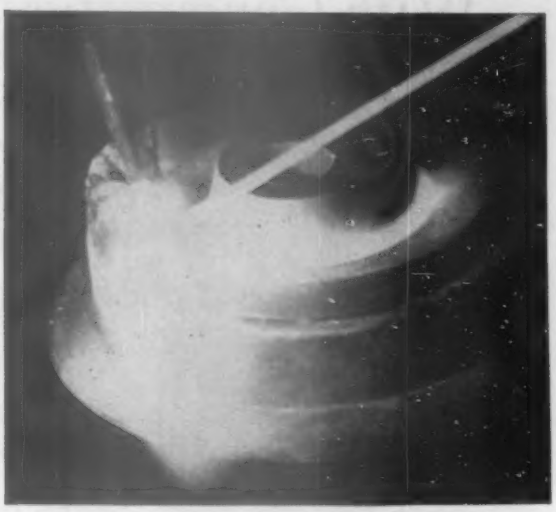
★ To meet a rapidly growing demand, the new Square D line of Class 9001 Type T oiltight pushbuttons has been designed for group mounting on machinery or control enclosures. Field and laboratory tests involving millions of operations were made with oils, coolants and cutting compounds in order to prove the oiltightness of these units under severe operating conditions. Other features of the new pushbutton line are quick, easy installation and unusual flexibility. Since the operating mechanism and the contact block are separate units, it is possible to obtain a combination to cover a wide range of circuit requirements with a limited stock of three types of operators and four types of contact blocks. **Industrial Controller Division, Square D Co., 4041 N. Richards St., Milwaukee 12.**

AO NOVIWELD-DIDYMIUM LENSES

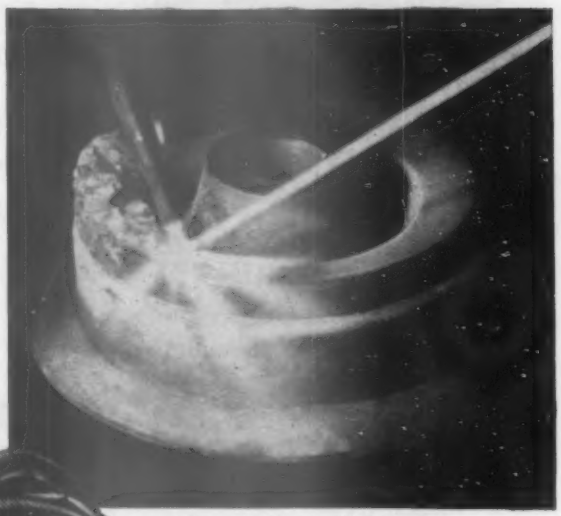
Give Your Welders Clearer, Safer Vision

- They screen out sodium flare
- They let the welder see his work in clear, brilliant colors
- They protect against ultra-violet and infra-red radiations
- They are ground and polished to ophthalmic standards

Available in shades 3, 4, 5 and 6



Seen Through Standard Welding Glass



Seen Through Noviweld-Didymium

With a clearer picture of his work, the welder can lay cleaner beads. As a result, secondary operations—chipping, grinding and wire brushing—cost less.

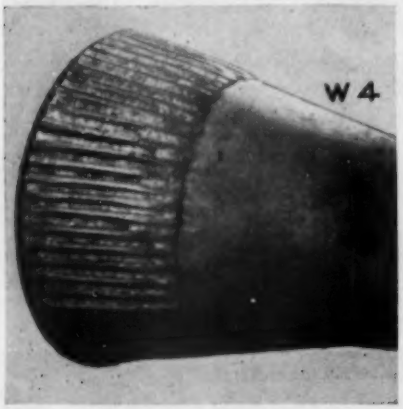
Let an AO Safety Engineer give you a demonstration. Phone or write your nearest AO Branch Office.

AO Duraweld Goggles are available with* Noviweld-Didymium *lenses

American Optical
COMPANY
SOUTHBRIDGE, MASSACHUSETTS

Saving Metal, Money and Time *With Conservation Welding*

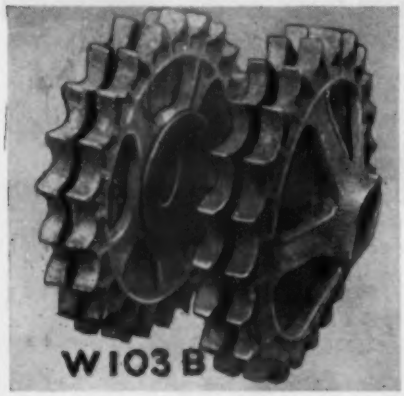
Incidental to war production an increasing number of worn ferrous equipment parts—the sort which used to be summarily scrapped — have been salvaged for further useful life with Amsco Welding Products. This practice has saved large amounts of scarce metals and obviated the difficulties and delays attending the procurement of new parts. At the same time, many additional establishments have become familiar with the substantial reductions in replacement costs afforded by Amsco Conservation Welding.



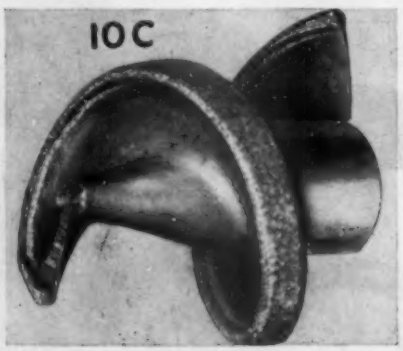
W-4. A rehabilitated manganese steel 128" crusher mantle. Amsco Nickel-Manganese Steel Filler Bars were swaged by hand to produce the proper contour, and were tacked onto the mantle, using Amsco Nickel-Manganese Steel Electrodes. Each bead was peened thoroughly. Total rehabilitation cost was $275.00.

Worn equipment parts which have been restored with highly wear-resistant Amsco welding materials often give as long service as new parts, and at considerably less cost. Substantial savings have also been obtained by hardsurfacing new parts with Amsco Welding Products which, having far higher wear resistance than the body metal, afford greatly increased service life. As replacement costs will assume added importance in the postwar period, *conservation welding* will be still more widely practiced.

A few examples of Amsco Conservation Welding are pictured. Others, with full information on Amsco Welding Products, are shown in Bulletin 941-W. Send for your copy.



W-103-B Sprockets from a tractor which were put in service at the same time. The one on the left had been rebuilt with Economy Hardface; the one on the right was a brand new sprocket. Note that the new one is worn to such an extent that it was necessary to resurface it with Economy Hardface, while the welded sprocket needed no repairs whatsoever.



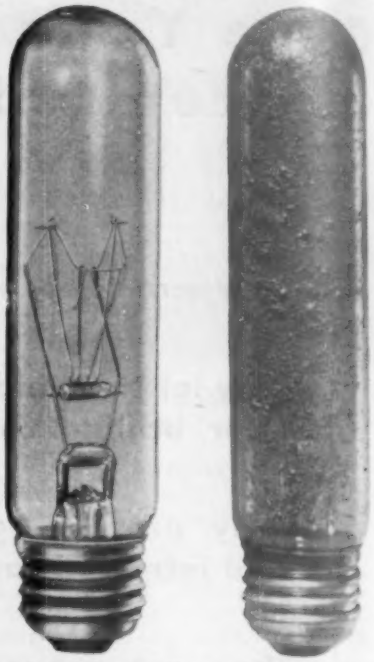
10-C This brick machine auger tip served over a year after being built up with Amsco Nickel-Manganese Steel Rod and hardsurfaced with Amsco No. 459 Rod, as compared to the usual performance of only a few months before replacement. A new part costs $45.00. Total salvage cost was $31.00.

Amsco
AMERICAN MANGANESE STEEL DIVISION
Chicago Heights, Illinois
FOUNDRIES AT CHICAGO HEIGHTS, ILL.; NEW CASTLE, DEL.; DENVER, COLO.; OAKLAND, CALIF.; LOS ANGELES, CALIF.; ST. LOUIS, MO.
OFFICES IN PRINCIPAL CITIES

AMERICAN Brake Shoe COMPANY

Spatterproof Lamps

★ A lamp designed especially for welders, one that withstands hot spatter and rough handling, is offered by the **Radiant Lamp Corp.**, 300 Jelliff Ave., Newark 8. This lamp has a sturdily constructed, almost jarproof filament and an envelope of a special glass that is able to resist the penetration of hot metal particles. Even a lamp submitted to as gruelling an ordeal as the one pictured on the right will continue to furnish light for welding. These lamps are manufactured in 50, 75, 100 and 150 watt sizes; many concerns, says manufacturer, are using the higher wattage lamps in order to secure better light for welding.



Visual proof that Radiant "Spatterproof" lamps will withstand hot metal spatter is afforded by the illustration on the right. The lamp still furnished light when the picture was taken.

» «

Goggles for Chipping

★ A chipping and grinding goggle made of lightweight transparent plastic is said to give positive protection against impact hazards as well as full visability and maximum comfort. Steaming and fogging of the lenses are prevented by perforated side vents, which allow ample ventilation. Other features are 50 mm shatterproof lenses, a readily adjustable nose bridge and an all-elastic headband. **Metro Mfg. Co.**, Long Island City 1, N. Y.

Metro plastic chipping and grinding goggle. Shatterproof lenses afford full protection.

BRAZING TO ±.0002" TOLERANCE WITH EASY-FLO

This Swivel Joint—a standard part of airplane hydraulic landing gear systems—is another strong argument for EASY-FLO brazed construction—another from the long list of EASY-FLO brazed parts which prove that this low-temperature silver brazing alloy makes strong, dependable assemblies—and does it fast and economically.

But this Swivel Joint demonstrates a further important point about EASY-FLO brazed construction—that close tolerances can be maintained without difficulty. The requirement of ± .0002" limits on the center to center distance of the finished assemblies was readily met.

There are 7 EASY-FLO brazed joints in the assembly—4 tubular and 3 internal. Brazing time on the former is 6 seconds per pair, and on the latter, 5 seconds per joint. This fast production is obtained by following the now widely practiced procedure of preplacing EASY-FLO wire rings at the joints and using a fast heating method —in this case induction heating.

BULLETIN 12-A TELLS YOU HOW

to quickly put your brazing on the fast, profitable EASY-FLO basis. It gives you complete EASY-FLO details and a lot of useful information about fast production methods, including preplacing the alloy. Write for a copy today.

ARMY E NAVY

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HANDY & HARMAN

82 FULTON ST., NEW YORK 7, N. Y.

Bridgeport, Conn. • Chicago, Ill. • Los Angeles, Cal. • Providence, R. I • Toronto, Canada

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Centering Head

★ A useful, time-saving tool, the Boyce centering head, will do the work of a protractor, centerhead, center punch, level and scale. This device consists of a sheet aluminum protractor dial graduated in 2½ deg and a punch with a hardened point. To mark an angle at any degree from center on a pipe or other round object, the dial is set so that the desired degree coincides with the centerline on the body. The tool is then placed on the object and moved slowly until the leveling gauge on the dial registers level; a light tap on the punch will then mark the precise location of the angle desired.

Other uses for this tool are to measure the degrees of an angle or bend on the outside or inside of any circumference, to measure the degrees of declivity of any flat surface, to measure (with the aid of a straightedge mark) an angle of any degree on a vertical surface. It can be used to lay off keyways, to make uniform pipe bends, to measure the declivity or tilt of any surface, to lay off manifolds, bell-ends and butt-ins, to mark off angles inside boilers, tanks or large-diameter pipe, or to find centerlines. **Eastern Research & Engineering Co.**, 37-39 Pearl St., Boston 10.

Boyce centering head. A pocket-size gadget that will do the work of five different tools.

» «

Portable Test Sets

★ A portable a-c test set capable of supplying smooth, stepless test voltages from 0 to 15,000 volts has been announced by the **General Electric Co.**, Schenectady 5, N. Y. Mounted on a three-wheeled truck, the equipment can be easily moved about and plugged into any convenient 115 or 230 volt, 60 cycle outlet. The set includes a step-up transformer, built-in electric timing clock, double-scale switchboard-type voltmeter, voltmeter scale selector switch and an air-circuit breaker with instantaneous overload trip.

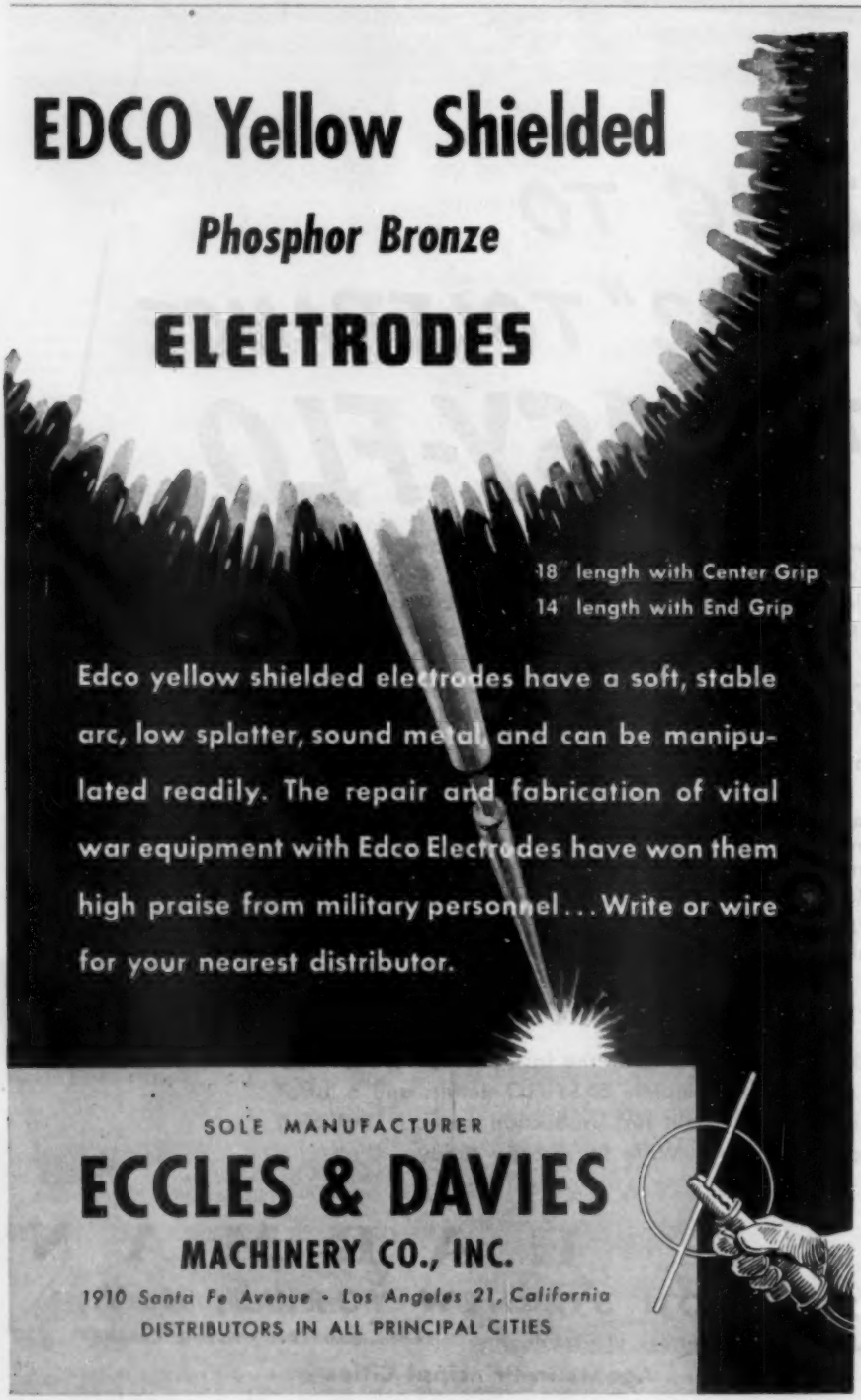
G-E portable 15,000 volt test set. It has a capacity of 5,000 volt-amperes and can be used to test generators, large motors, transformers, etc.

Two portable a-c test sets capable of supplying smooth test voltages from zero to maximum (2,000 and 6,000 volts) have also been announced by General Electric. Either set can operate from any 115 volt, 50 or 60 cycle outlet and both have a capacity of 2,000 volt-amperes. These units have many industrial testing applications such as generators, motors, motor parts and appliances.

» «

Powdered Soapstone Crayon

★ To help alleviate the difficulties in obtaining metal workers' crayons, the new "Steelrite" brand of soapstone crayon has been placed on the market. This is made from powdered soapstone "sawdust," a waste product of the cuttings of natural crayons. The composition crayon, states manufacturer, wears 20% slower than a natural one, weighs approximately 35% less and contains no wax. Available in standard 5 in. lengths in square, round, flat or thin shapes. **Whittaker, Clark & Daniels, Inc.**, 260 West Broadway, New York City 13.


EDCO Yellow Shielded
Phosphor Bronze
ELECTRODES
18" length with Center Grip
14" length with End Grip
Edco yellow shielded electrodes have a soft, stable arc, low splatter, sound metal and can be manipulated readily. The repair and fabrication of vital war equipment with Edco Electrodes have won them high praise from military personnel... Write or wire for your nearest distributor.
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ECCLES & DAVIES
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1910 Santa Fe Avenue • Los Angeles 21, California
DISTRIBUTORS IN ALL PRINCIPAL CITIES

STEVENS

TUFFLINE

GENERATOR CUT-OFF PANEL

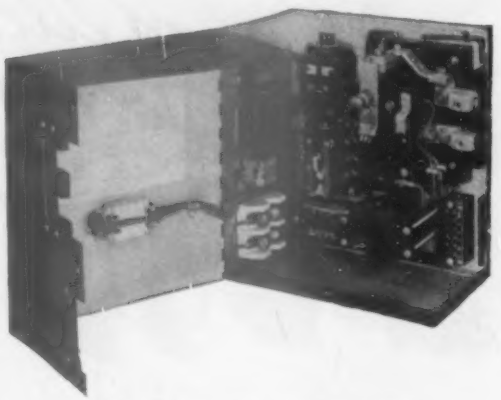
SAVES POWER
•
IMPROVES POWER FACTOR
•
DECREASES MAINTENANCE

Tuffline Panels can be installed on any welding generator in fifteen minutes. Once installed they act as never-failing monitors, cutting off generators automatically and starting them up again automatically whenever a welder strikes his rod to the ground.

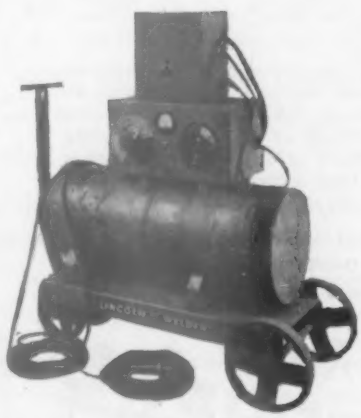
In any plant with a large number of single operator welding generators, particularly where there is any tacking done, many generators run at no load as much as 90% of the time. These generators are using electricity that might be put to better service on other machines. They are lowering power factor in the plant, and are wearing brushes and armatures to no purpose.

By using Stevens Cut-Off Panels, the expense of idling generators is completely eliminated — *and the panel will pay for itself in from 6 to 10 months.*

Every panel is guaranteed for one year against mechanical or electrical defects. A Stevens representative in your territory will gladly arrange a free demonstration.



INTERIOR VIEW OF CUT-OFF PANEL



CUT-OFF PANEL ATTACHED TO GENERATOR

DIMENSIONS: 11" x 14" x 5"

WEIGHT: APPROX. 20 LB.

PRIMARY VOLTAGE: 220/440 VOLTS

TIME SETTING: 0 TO 6 MIN. (ADJUSTABLE)

C. H. STEVENS & COMPANY

15 ANN STREET, SOUTH NORWALK, CONN.
TEL. NORWALK 6-3315

3216 SACRAMENTO BOULEVARD, SACRAMENTO, CALIF.
TEL. SA. 5-2388

Adjustable Triangle

★ Engineering draftsmen should find many uses for the Bruning adjustable triangle—the equivalent of many different triangles plus a protractor. It is made of heavy but transparent plastic through which even light pencil lines can be clearly read. The protractor scale ranges from 0 to 90 deg in graduations of ½ deg. The calibrations are large and easy to read and cannot be erased by any amount of handling since they are molded in on the underside of the piece and protected by the base angle. A large-size thumb screw permits quick setting for scribing lines at any desired angle. The triangle has a base of 6¼ in., an altitude of 7⅞ in. and weighs less than 3 oz. Suggested uses include drawing of screw threads, helical springs, bevel gears, etc. or for any drawings or plans requiring accurate angles. Charles **Bruning Co., Inc.**, 4754 Montrose Ave., Chicago 41.

A combination of triangle and protractor, this new drafting tool has many uses.

» «

Multipurpose Positioner

★ The latest "Standard" powered welding positioner rotates work up to 700 lb at speeds up to 2.4 rpm in either direction. Height of the table is adjustable between 30 and 36 in. by means of an elevating screw, and tilting through 135 deg from the horizontal is controlled by a spring-centered handle which the operator moves in the direction of the desired table movement.

This unit will accommodate table speeds up to 180 in. per minute with a work radius of 1 ft. Linear speeds at all radii are easily set and indicated on a scale located on the side of the frame. To obtain a desired welding speed, it is only necessary for the operator to note the approximate radius at which the welding is to be done and move the control wheel until the indicator is opposite the desired welding speed in the scale column for that radius. For sequence or step welding, the table may be positively started, stopped or reversed. This machine has proved adaptable for such operations as moving work past the torch and quench in flame-hardening set-ups. If desired, the table can be removed to permit jigs of various types to be attached directly to the spindle. Further flexibility is provided by the fact that the work mounted on the positioner table may be tilted to any angle while it revolves.

This positioner is 32 in. long without motor dimensions or 39½ in. long overall, 19 in. wide and weighs 665 lb. The table is 28 in. in diameter, ⅝ in. thick and rotates on an elevating screw of 2 in. diameter. The unit is provided with a built-in variable-speed transmission and hydraulic cylinder for power control and a ½ hp, 110, 220 or 550 volt motor. **Standard Machinery Co.**, Providence 7, R. I.

Standard welding positioner. It rotates and tilts, will handle work up to 700 lb.

BIG JOBS

and little jobs

GO HAND in HAND

WITH

MARQUETTE

REGISTERED U.S. PAT. OFFICE

A.C. ARC WELDERS

All the power you need for welding heavy steel structures . . . and perfect arc control for welding light sheet metal. With Marquette's matchless welding power you can really "pour it on" . . . and without troublesome "magnetic blow" to hamper production.

Cast iron, malleable castings, aluminum, in fact, every size and type of metal, no matter what the job, Marquette A. C. Arc Welders will turn out strong, good looking welds faster and at less cost. These features make it the ideal welder for both High Speed Production and Maintenance.

10 MODELS, 125 to 400 Amps.

COMPLETELY EQUIPPED

Send for free 24 page illustrated booklet

BUY THE BEST . . . BUY MARQUETTE

MARQUETTE MFG. CO., INC.

Minneapolis 14, Minnesota

MARQUETTE

REGISTERED U.S. PAT. OFFICE

WELDING

Equipment

ELECTRODES AND SUPPLIES

A FAT HOT Spark

THE *FIRST* TIME *EVERY* TIME

WITH THE Meco TRIPL-FLINT LIGHTER

Self-Laudation is rarely convincing . . . but the opinion of others is not to be ignored

Modern Engineering Co.
St. Louis, Missouri

Gentlemen:

We are unable to obtain thru our local company either Meco Lighters or renewal flints. Is it possible for me to get these direct from you?

My two helpers and myself have always used this . . . lighter and prefer it to any other make. If possible send price list.

Respectfully,
**J. B. H.*
Welder Operator
. . . . . Railroad Co.
I. . . . . , Indiana

**Original letter on request.*

The Meco Tripl-Flint Lighter has been designed and constructed to withstand hard wear and hard usage. It will serve a long period of useful life. It is the one *really* heavy duty lighter, no wires or springs . . . the lighter that will ignite any type of gas under even the most adverse conditions — high winds, moisture, rain, snow or sleet.

It is the only lighter equipped with three large flints, as a *part* of the lighter itself. This provides for renewal in a few seconds of time — a coin or any piece of flat metal will operate the set screw to rotate a new flint into position.

Most important, the Meco Tripl-Flint Lighter embodies the engineering details consistent with the outstanding design, construction and pioneering developments of *all* Meco Equipment. This 50c article is typical of Meco quality in *all* Meco Oxyacetylene Welding and Cutting Equipment.

Welding and Cutting Equipment

MODERN ENGINEERING CO.

3413 PINE BOULEVARD **ST. LOUIS, MISSOURI**

AO face shield with clear cellulose-acetate window for general purposes. Another type of window is available for welding and cutting.

Face Shields

★ Four new AO face shields are offered to provide light-duty protection on such operations as welding, scarfing, metal sawing, buffing, sanding and light grinding. Three types of button-on windows are available for these shields: clear-cellulose acetate for general purposes (illustrated), 24 mesh screen for heat protection, fibre with a filter glass window for welding and scarfing.

The new face shields are light in weight and may be worn without discomfort by workers who wear prescription glasses. The F-100 shield has an adjustable elastic headband, leather sweatbands which button on like the windows and a fibre headpiece. The F-200 is the same as the F-100 but with the addition of a standard spark deflector (forehead guard). The F-300 shield is identical to the F-200 except that the back headband is of fibre construction. The F-400 shield offers all of the features of the F-300 plus a full spark or head deflector, designed for working in confined places where head bumps or lacerations may occur. **American Optical Co.**, Southbridge, Mass.

» «

A-C Welders

★ The new G-R models 25C and 35C represent this manufacturer's first transformer-type a-c welders of the heavy-duty production type to be offered in the 200 and 250 amp ratings. These two

G-R 25C heavy-duty a-c arc welder with built-in power factor correction.

additions complete the G-R line of "C" models (power-factor-corrected production welders). Welding range of the 25C is 15 to 230 amp; it is designed for continuous use on a 60% duty cycle and is approved by Underwriters' Laboratories. The 35C model has a range of 15 to 330 amp.

The "C" welders feature built-in power factor correction, spun glass transformer coil insulation, heavy-duty design with larger cores and increased copper, and a wide output range—all models will cut down to handle a 1/16 in. electrode. Another feature is G-R's flux-diversion type of "stepless" heat control, with which input is directly proportional to output. Power factor increases at lower input, contributing a leading power factor to the plant system when welding at lower heat ranges or during non-welding periods with primaries connected to the line. **Glenn-Roberts Co.**, 3100 East 10th St., Oakland 1, Calif., or 2107 Adams St., Indianapolis 1.

Highly Versatile "Pencil Weld Gun" Welds Cold... Corrects Flaws and Defects ... Saves Man Hours, Materials

The Pencil Weld Gun, used with its Vibra-Weld Transformer, offers simplicity and versatility never before known in the industry. Equally effective in correcting flaws and defects in both ferrous and non-ferrous metals—for welding cold, without setting up stresses or crystallization.

Simple in Operation, the Pencil Weld Gun requires but a few moments' practice to achieve results formerly unobtainable with any method. Utilizing a combination of air, high amperage and low voltage, the weld never exceeds 125° to 130° F. The gun uses a pure aluminum or nickel rod, which is applied directly to the defective area. When the surface has been finished and polished off, it is impossible to detect the repair. Easy to use, as gun peens and welds simultaneously. The Pencil Weld Gun and Vibra-Weld Transformer can be used wherever 220 volt single phase electricity and air outlets are available.

Unavailable, however, is Wrigley's Spearmint Gum. As the makers of Wrigley's Spearmint are unable to continue manufacture of the product up to their quality standards under present conditions, the only unqualified protection they can give to the consumer and the dealer alike is to keep the Wrigley's Spearmint wrapper empty. While they advertise this empty wrapper, none is being made and any found on the market is old production of a perishable product.

You can get complete information from
Mid-States Equipment Company
2429 South Michigan Avenue, Chicago 16, Illinois

Close-up of new Pencil Weld Gun

Pencil Weld Gun with Vibra-Weld Transformer

Z-66

BEAT THE JAPS!
BUY *MORE* WAR BONDS

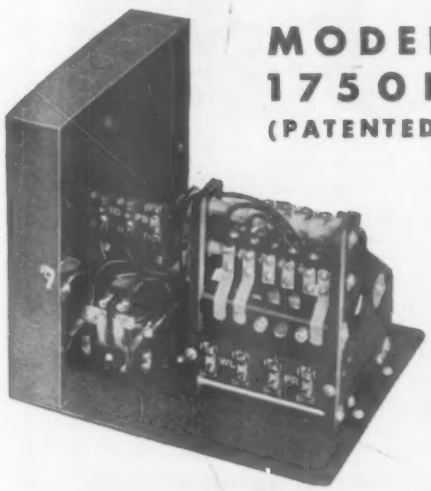
Our New, War-Tested, Precision-Built

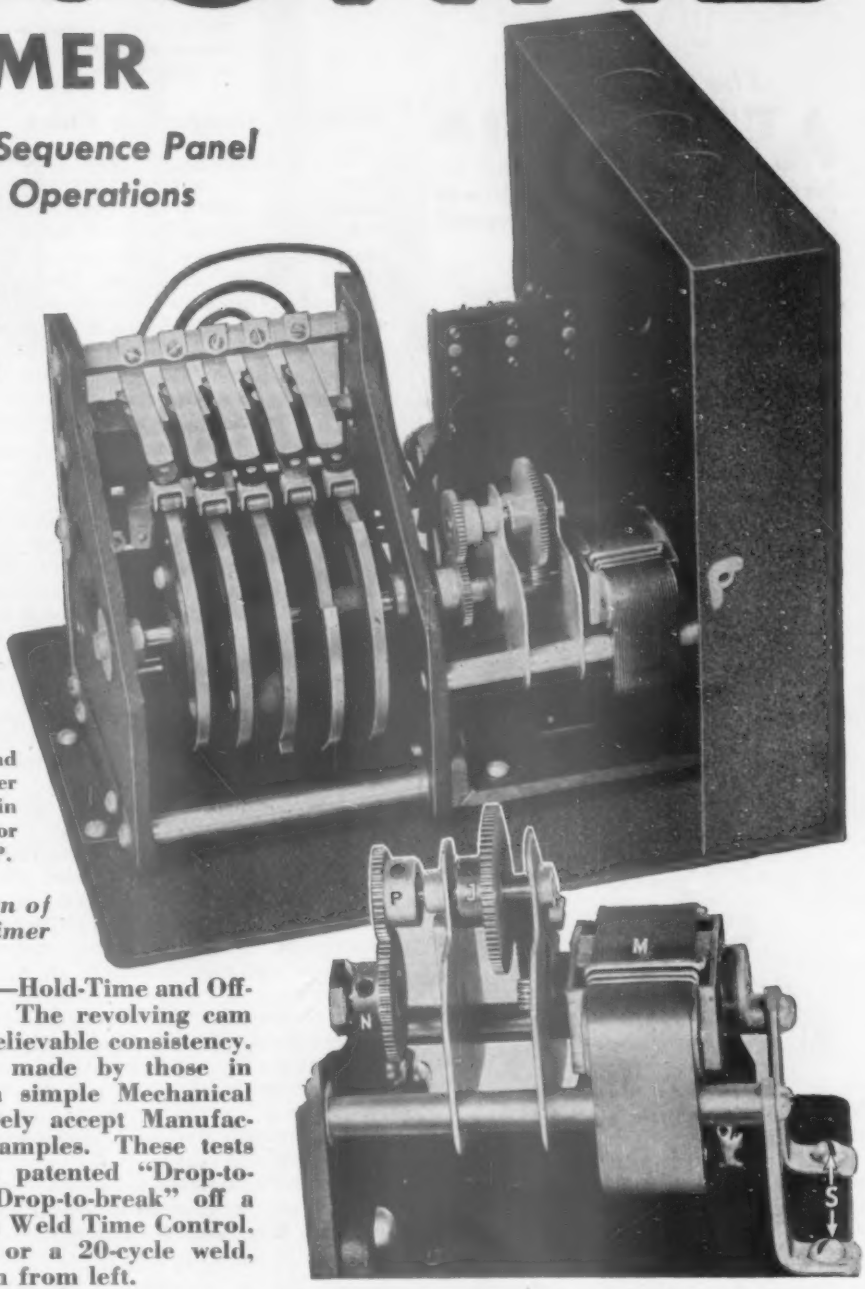
NATIONAL

WELD-TIMER

A Complete Weld-Control Sequence Panel for Resistance Welding Operations

MODEL 1750P (PATENTED)





Above: Left view showing control relays and input wire connections. Right: The Timer with cover removed, reveals every function in full, accessible view. There are NO tubes, or hidden invisible operations with Model 1750P.

Simplicity is the Keynote in the design of this New 1945 Model 1750P Weld-Timer

It controls Squeeze-time—Weld-time—Hold-Time and Off-interval—ALL in positive sequence. The revolving cam assembly accomplishes this with unbelievable consistency. Countless Oscillograms have been made by those in doubt, who were eager to adopt a simple Mechanical Weld-control, but unwilling to merely accept Manufacturer's statements, and Spot-weld samples. These tests proved the Accuracy of National's patented "Drop-to-make" off one cam, followed by "Drop-to-break" off a companion cam method of Precision Weld Time Control. You can obtain a One-cycle weld, or a 20-cycle weld, simply by positioning the fourth cam from left.

Is it any wonder that one manufacturer is using more than 400 Type 1750P Weld-Timers on essential War Production? Dozens of plants are using upwards of 50 National Timers. It takes Performance, not Salesmanship, to get Re-orders!

Illustrated above, is the compact 1750P drive motor and change-gear train, that provides quick-change in welding rates, and motive power. The entire assembly is readily removed—just 2 screws hold it. Welding rate (RPM of cam assembly) is easy and quick to change. Replace one pair of change gears, marked P and N, and you can vary the rate from 35 spots low, to over 300 spots per minute, in 24 stages. An Allen set screw holds gears on shaft. "P" slides off shaft end to the left, and "N" off cam shaft below to the right. Weld rate table is provided with equipment.

NATIONAL TIME & SIGNAL CORPORATION

600 E. MILWAUKEE AVENUE **DETROIT 2, MICHIGAN**

The General Says

ATTENTION

Write today for the complete information which General Blower Co. has prepared for you regarding

GENERAL WELDING FUME EXHAUSTERS

Ask for Portfolio CB-103—W.E.

High Velocity Exhaustion by High Speed Centrifugal Fans 2 to 10 Inlets

GENERAL BLOWER COMPANY

Producers Of Air Moving Equipment

401 North Peoria Street Chicago 22, Illinois

Helpful Literature Just Published

The following reviews are of recent publications of interest to those in the welding industry. Unless otherwise stated, they may be obtained without cost by writing to the manufacturers listed.

Electrode Comparison Chart

To ascertain the type of electrode from its trade name or vice versa is sometimes a difficult and time-wasting task. THE WELDING ENGINEER has in the past presented two Engineering Data Sheets (March, 1943, and December, 1944) which listed electrode trade names under their comparable AWS designations for mild-steel electrodes. Including and adding to this information is a new eight-page, letterhead-size "Electrode Comparison Chart" from Allis-Chalmers which compares various stainless-steel and hard-facing electrodes as well as those for mild steel.

The material is divided into four large tables. The first table, listing the electrodes of 21 manufacturers, covers bare electrodes, dusted electrodes, heavily coated mild-steel electrodes (by AWS classification numbers), alloy electrodes (AWS classes E-7010, E-7020 and E-7030) and three special types—machinable cast-iron weld deposits, non-machinable cast-iron weld deposits, all-position welding for slight resistance to abrasion.

The second table covers electrodes for welding stainless steel and armor plate, listing the products of 15 manufacturers by AISI classifications. The third table, devoted to a weld-deposit analysis of stainless-steel electrodes, gives the percentages of chromium, nickel, carbon, columbium and molybdenum in 18 AISI classifications.

The fourth table classifies electrodes for hard-facing (12 manufacturers) by: (1) resistance to abrasion and impact; (2) resistance to abrasion, erosion and mild impact; (3) resistance to severe abrasion, erosion, corrosion and impact and (4) dies and cutting tools.

A copy of this bulletin, B6344A, may be obtained on request to the **Allis-Chalmers Mfg. Co.**, Milwaukee 1.

» «

Eutectic Bulletin

Those who would like to know more about Eutectic "Low Temperature" welding alloys will probably find most of the answers in a recently published four-page, letterhead-size folder which explains the meaning of the term "eutectic alloy" and the uses and applications of such rods. The back page of the folder is devoted to a "Selector Chart" by means of which the proper electrode or welding rod can be picked to do a particular job on a particular type of material. **Eutectic Welding Alloys Co.**, 40 Worth St., New York City 13.

» «

Ampco Bulletins

"Ampco-Trode Welding Technique," Bulletin W-2, is a 32-page booklet describing the various methods of welding with coated aluminum-bronze electrodes and welding rods. Sections are devoted to metal-arc, carbon-arc and oxy-acetylene welding.

"Ampco-Trode Electrodes," Bulletin W-3, is an eight-page, letterhead-size booklet describing in detail the five standard types of aluminum-bronze electrodes and welding rods. The chemical composition and physical properties of each type are given as well as information on its uses and applications. **Ampco Metal, Inc.**, 1745 S. Thirty-Eighth St., Milwaukee 4.

» «

Fire Extinguisher Guide

To help mobilize employee fire fighting, **Randolph Laboratories, Inc.**, 8 East Kinzie St., Chicago 11, has prepared a gum-edged, 8½ by 20 in. chart to be posted over every fire extinguisher in the plant. The "Fire Extinguisher Installation Guide" divides fires into the standard A, B and C classifications, picturing both typical fires and the appropriate extinguishers for each installation. The extinguishers pictured include carbon-dioxide, vaporizing liquid (carbon tetrachloride), soda-acid, foam, and pump tanks.

» «

X-Ray Information

How low-voltage industrial X-ray units are being employed for quality control of spot welds is explained in a new 12-page, letterhead-size bulletin, "5 to 50 kvp industrial X-ray units." Sample pieces of sheet aluminum, magnesium, stainless steel, etc., are welded under various conditions, and the welds are then radiographed, using fine-grain film. The booklet reproduces sample radiographs which show such faults as cracks, undersize, nugget extrusion, "doughnuts," etc. The 5 to 50 kvp machine is also used for microradiography and for the inspection of materials having a relatively low density such as plastics and plywood. **Picker X-Ray Corp.**, 300 Fourth Ave., New York City 10.

Wartime Research Experience takes ordinary Rutile...and produces the superior

Ruflux

TAMCO is...and has been for a number of years... the largest supplier of titanium compounds used in welding rod formulation, such as rutile, potassium and sodium titanate. Also, we furnish alloys such as 40% low carbon ferro titanium, nickel and manganese titanium for special coating formulation and compounds such as zircon, potassium zirconate, etc. Manufacturing operations covering these compounds are carefully controlled, and uniform products are assured at all times.

RUFLUX S A sodium titanate containing approximately 80% TiO_2 and 15% Na_2O. Another arc stabilizer and formulated to reduce hycroscopic action to a minimum.

---

1. Ruflux 61—A 93% to 95% TiO_2 containing rutile milled to from 0.5% to 1½% on a 200 mesh screen. Major impurities are SiO_2, $ZrSiO_4$, Fe_2O_3 and FeO. Injurious impurities such as S. and P_2O_5 are kept to a minimum.

2. Ruflux 84—A 93% to 95% TiO_2 containing granular rutile of similar analysis to Ruflux 61. This coarser rutile is used to avoid coating dry cracking.

3. Ruflux P—A potassium titanate containing approximately 73% TiO_2 and 19% K_2O. This compound is used for arc stabilization purposes and contains no injurious impurities. Ruflux P is milled to approximately 4% on a 200 mesh screen.

4. Ruflux Z—A zirconium silicate containing approximately 65% ZrO_2 and 34% SiO_2 combined as $ZrSiO_4$. The compound is milled to 0.10% on a 325 mesh screen and due to its high melting point (3850 F°.) is used as a slag stiffener.

5. Ruflux P. Z.—A potassium zirconate containing 80% to 81% ZrO_2, 14% to 15% K_2O, 3% to 4% SiO_2 and smaller percentages of TiO_2, Fe_2O_3, CaO, etc.

6. Ruflux T—A zirconium oxide containing from 90% to 91% ZrO_2, 5.00% SiO_2, 0.80% Na_2O and lesser percentages of TiO_2, CaO, Al_2O_3, etc. Ruflux T is milled to 0.1% on a 325 mesh screen.

7. 40% Low Carbon Ferro Titanium—containing from 38% to 42% Ti., 3% to 5% Si., 6% to 9% Al., 1% to 2% Cr. The alloy is milled to minus 80 mesh.

8. Tam Nickel Titanium—contains from 25% to 28% Ti., 60% to 65% Ni., 6 to 8% Al., 2% to 4% Si., and 2% to 5% Fe. The alloy is milled to minus 80 mesh.

9. Tam Manganese Titanium—contains from 27% to 29% Ti., 35% to 40% Mn., 20% to 25% Fe., 7% to 9% Al and 2% to 4% Si. The alloy is milled to 80 mesh.

Tamco also manufactures alloys such as Ferro Carbon Titanium, Bortam and boron containing titanium alloys, and various other titanium and zirconium compounds.

We will be glad to produce any other titanium and zirconium compounds of interest to the welding rod industry as soon as the emergency is over.

It pays to include these compounds in your welding rod coating formulation research.

THE MERIT MARK OF METAL
TAM
METALLURGICAL ALLOYS

THE TITANIUM ALLOY MANUFACTURING COMPANY

Executive Offices: 111 Broadway, New York, N. Y. *General Offices and Works:* Niagara Falls, N. Y.

Victor Annual Bulletin

"Welding—its past and its future" might well be the title of the 1945 annual bulletin of the Victor Equipment Co. Whereas the two previous annual bulletins were devoted primarily to the company's participation in war production, the present number takes the historical approach and shows from the accomplishments of the past what the welding industry may expect to find in the coming postwar era. No definite predictions as to the extent of future national business are made; nevertheless, it is deemed unlikely that industry "will deny itself in the peacetime years to come the great advantages and economies which have now become so much better understood and so much more widely applied."

"It is interesting to recall," states Victor's President L. W. Stettner in his foreword, "that the great peak reached by the welding industry in World War I remained forever after the lowest dollar sales volume even during the depth of the past depression years."

This booklet is featured by reproductions of old wood cuts and copper engravings picturing such highlights of welding and cutting history as the candle welding lamp used by Lazarus Ercker in 1574 and the crude and laborious method of cutting metals with giant scissors which existed in 1763. Another feature is a series of color charts portraying the past eleven-year development of the gas, the electric and the resistance-welding fields and comparing welding industry dollar sales and welding rod consumption with the production of steel ingots from 1932 to 1943 inclusive. **Victor Equipment Co.**, 844 Folsom St., San Francisco 7.

» «

"Two-Tone" Welding

Resisto-Loy Bulletin No. 7 is an eight-page, letterhead-size booklet devoted entirely to the "Two-Tone" welding process for the repair, rebuilding and hard-facing of tractors, shovels, rock crushers, buckets, pumps and other heavy-duty equipment. The process consists of welding in conventional manner with a ¼ in. coated mild-steel electrode in the holder while holding the end of a ⅛ in. bare alloy filler rod adjacent to the arc. The bulletin explains the technique in detail, cites its advantages and furnishes the details of several actual jobs which were handled in this manner. Lists are also given of suitable auxiliary rods and electrodes for the "Two-Tone" process. **Resisto-Loy Co.**, Grand Rapids 7, Mich.

» «

Leaflet on Plating

A two-page, letterhead-size leaflet describes "Spekwite," a proprietary compound for electroplating. This material is said to give a white, tarnish-resisting finish that has over 81% the reflectivity of silver. A steel tank, which serves both for plating bath and anode, is virtually all the equipment required. **Special Chemicals Co.**, 30 Irving Place, New York City 3.

» «

Welding & Cutting Catalog

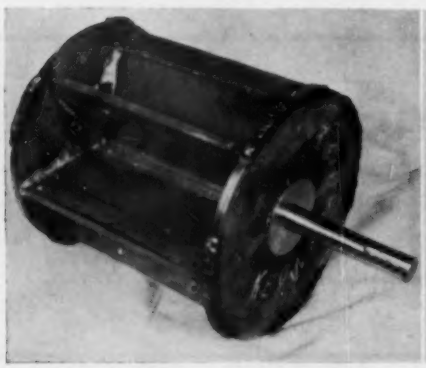
A 9 by 11½ in. looseleaf catalog of 38 pages covers the Trex line of welding and cutting equipment. The products listed include: pressure regulators, safety valves, oxygen or hydrogen manifolds, hose couplings and nipples, welding torches and tips, cutting torches and tips, machine-cutting torches, cylinder trucks, oxy-acetylene hose, safety goggles, helmets and shields, etc. **Trex Engineering Supply Co.**, 611 McCarter Highway, Newark 5.

» «

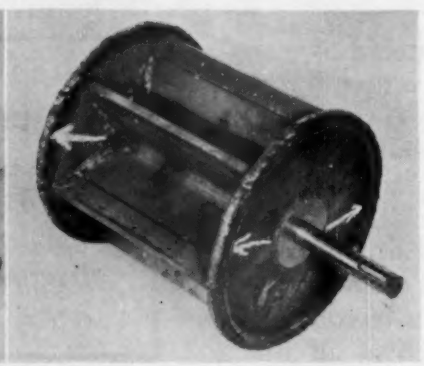
Automatic Welding Bulletin

Suggestions for the selection of equipment for automatic arc welding are given in an informative bulletin entitled, "How to Select Equipment for Unamatic Arc Welding." The points covered include: direct current; alternating current; "open arc"—using light-coated wire; "protected arc"—using light-coated wire and tape; "concealed arc"—using light-coated wire with granular flux. **Una Welding, Inc.**, 1615 Collamer Ave., Cleveland 10.

There's a 3-WAY ADVANTAGE in Arc Welding Cast Iron with PHILLIPS "600" Electrode



A build-up was required on the worn head plates of this cast iron feeding drum. No distortion could be tolerated. Above photo shows where machining had to be done and how distortion was avoided by spacing of the deposits.



Edges were built up without any preheating whatsoever. Short deposits, 1" to 1½", alternating at opposite points, prevented distortion. After welding, head plates were machined to correct diameter, and faced on the outside. Line of fusion was fully machinable.

NO PREHEATING is necessary in this application, because the electric arc concentrates the heat and confines it to a small area. Warping is prevented and the expense of preheating is eliminated.

NO DISTORTION occurs, because with the recommended procedure of alternating small deposits at opposite sides of the casting, the distribution of heat is equalized and no portion of the casting is allowed to absorb too much heat at any one time.

NO HARD SPOTS occur either in the deposit or *at the line of fusion*, because PHILLIPS "600" is a non-ferrous electrode, containing no iron or other carbide forming elements. No difficulty will be encountered either in milling operations or in turning operations.

The fact that deposited metal from PHILLIPS "600" Electrode is fully machinable, even at the line of fusion, and is of the color of cast iron, makes this electrode acceptable for applications where no other electrode could be used with complete satisfaction.

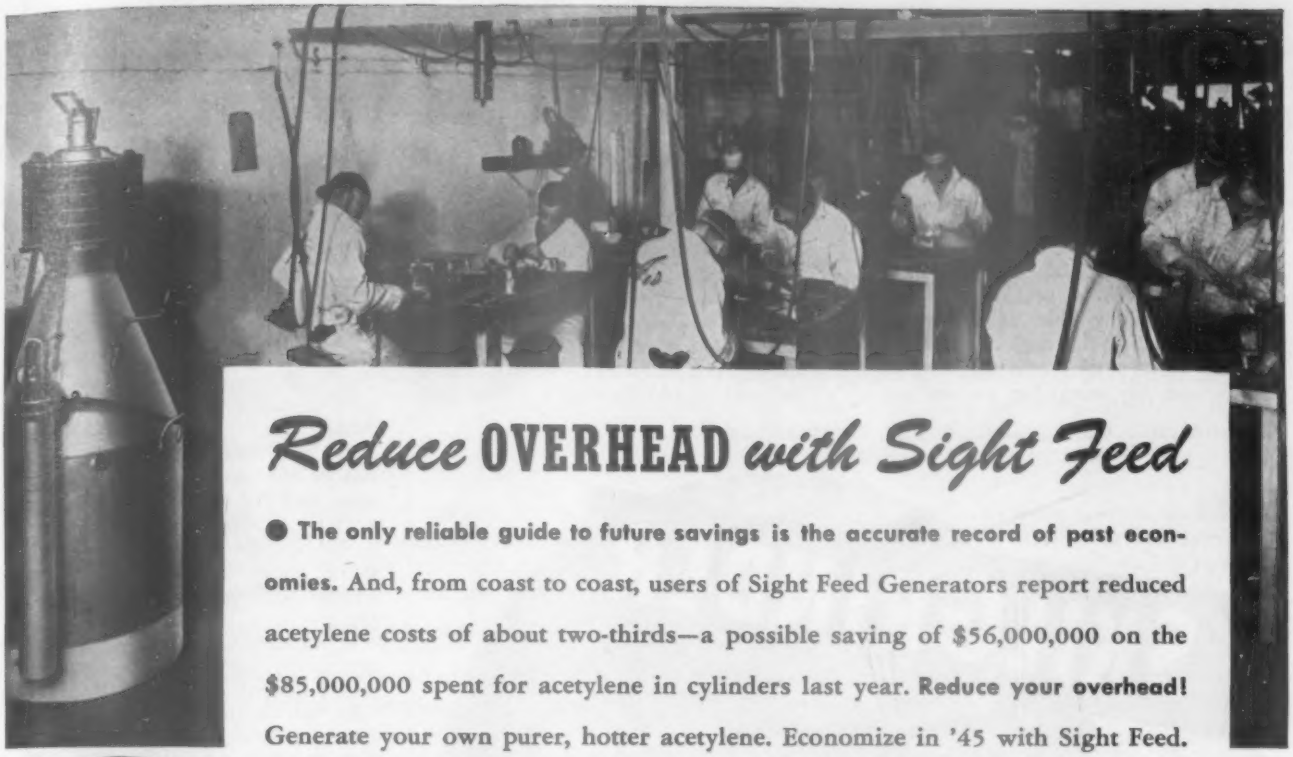
THIS BOOK TELLS HOW

Our "4-Ways" manual is a complete guide to the selection of materials and procedures for arc welding cast iron. Send for your copy TODAY.

C. E. PHILLIPS & COMPANY

2750 Poplar Street, Detroit 8, Michigan — 332 So. Jefferson St., Chicago 6, Illinois

MANUFACTURERS AND DISTRIBUTORS OF WELDING ELECTRODES AND SPECIALTIES



Reduce OVERHEAD *with Sight Feed*

● **The only reliable guide to future savings is the accurate record of past economies.** And, from coast to coast, users of Sight Feed Generators report reduced acetylene costs of about two-thirds—a possible saving of $56,000,000 on the $85,000,000 spent for acetylene in cylinders last year. **Reduce your overhead!** Generate your own purer, hotter acetylene. Economize in '45 with Sight Feed.

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C-F

POSITIONERS

Where a "Quick Change" is Needed

In production welding, which means working on top, bottom and on all sides of the weldment, a "Quick Change" of position is necessary for greater time saving, greater efficiency, greater safety to men and materials, and with resulting LOWER COSTS. A C-F positioner will do all this at the press of a button, without crane help or handling crews—it will rotate a full 360° at variable speeds from 0 R.P.M. up, tilt to 135° beyond horizontal, and permits welding, down-hand, all sides, surfaces and angles in the one set-up with larger rods and fewer passes. All C-F positioners are pedestal mounted for maximum floor and work space—all are adjustable for height.

Write for Bulletin WP-22

CULLEN-FRIESTEDT CO.

1309 South Kilbourn Avenue Chicago 23, Ill.

Student's Booklet

To help welding students and beginners, Victor has made available for vocational training schools and other interested enterprises a 46-page, 5 by 7 in. booklet titled "Setting up a Victor Welding or Cutting Unit." Pictures and text are used to teach the assembly and operation of an oxy-acetylene welding and cutting outfit in a detailed step-by-step procedure which no one can misunderstand. Safety precautions are included as well as tables of such information as cutting-tip drill sizes and tip cleaner sizes, oxygen and acetylene pressures and tip sizes for various metal thicknesses in cutting operations, welding tip sizes and gas consumption data, etc. Several blank pages are left for the student's own notes. **Victor Equipment Co.**, 844-54 Folsom St., San Francisco 7.

» «

Veterans' Readjustment Manual

When the men who have retaken the Philippines, occupied Iwo Jima and Okinawa and smashed Nazi armies all the way across Germany return to civilian life what kind of treatment do they expect from industry? What kind of treatment should they get? These questions are answered, at least partially, in a 44-page, 5 by 7 in. manual, "You and the Returning Veteran," published by Allis-Chalmers as a guide for foremen.

The average serviceman, the booklet explains, does not want to be coddled nor does he want favors. He does expect a reasonable time and opportunity to be given to him to readjust himself. He wants to be wanted—not as a war hero but as a worker who will soon be able to pull his own share of the load. The foreman, being closer than any other member of the supervisory force to the returning veteran, is presented with an enormous responsibility. Most veterans will be able bodied, well disciplined and return as even better workmen than they were before induction. Such will not be the case with all of them, however, and for this reason it is very important for the foreman to treat each ex-serviceman as an individual. Admittedly, some cases will be difficult to handle with sympathy and understanding.

A number of interesting case studies are given of returning veterans who found difficulties, both real and imaginary, in readjusting themselves to industry. These personal accounts give a very good idea of the type of human problems that will be presented in large number as men are demobilized.

A copy of this book will be sent without cost to any interested group or employer. **Allis-Chalmers Mfg. Co.**, Milwaukee 1.

» «

Rules for Textbook Awards

A twelve-page, letterhead-size brochure covering the object and purpose of the award program for textbooks in modern design and setting forth all rules and conditions governing the program has just been published by trustees of The James F. Lincoln Arc Welding Foundation. This is the official document of the new award program (announced in THE WELDING ENGINEER, page 82, April), to encourage the preparation of textbooks for use of engineering undergraduates in machine design and in structural design for fabrication by all processes including welding. It thoroughly covers the types of subject matter to be treated in these two important fields, listing the awards, which total $20,000. A copy may be obtained gratis by anyone interested. Requests should be addressed, Secretary, **The James F. Lincoln Arc Welding Foundation**, Cleveland 1.

» «

Grinding Wheels and Shapes

Information on the various types and sizes of "Stermount" grinding wheels and shapes available is given in a new four-page, letterhead-size folder titled "Stermount." These wheels and points are designed to permit cleaning, sharpening, cutting and polishing operations in hard-to-reach locations. **The Sterling Grinding Wheel Division** of The Cleveland Quarries Co., Tiffin, O.

SKILGRINDER
HANDIEST TOOL
IN THE
WELDING SHOP!
For grinding down rough welds, for removing scale, or for filing, cleaning and buffing there's no tool as handy as a SKILGRINDER. You can take it right to the job anywhere in the shop, avoid moving heavy objects and get more finishing work done in less time. Judge for yourself after you've seen a demonstration by your distributor. Call him today!
SKILSAW, INC.
5033-43 Elston Ave., Chicago 30, Ill.
Factory Branches in All Principal Cities
PORTABLE ELECTRIC
SKILTOOLS
MADE BY SKILSAW, INC.
PLANNING RETOOLING AFTER-THE-WAR?
Let SKILTOOL Field Engineers help you now to plan "tooling-up" for more efficient and economical peacetime production with SKILSAW'S new postwar tools.

Anti-Spatter

"FOR BETTER WELDING"

ANTI-SPATTER practically eliminates oxidation—cuts down the amount of slag covering weld. It also fortifies the action of rod coating—less slag, easier to remove. Weld rust practically eliminated.

Easy to apply—simply brush on before welding. After welding, **ANTI-SPATTER** is easy to remove. If surface is to be painted, remove with wet cloth or usual degreasing methods—otherwise use dry rag.

Get speedier and better looking production and save man hours in costly cleaning. **ANTI-SPATTER** is non-inflammable, non-toxic and has no disagreeable odors.

WRITE TODAY FOR DESCRIPTIVE FOLDER ON ANTI-SPATTER

TRI-FLUX
A new and hotter soldering flux.
No. 5 for Stainless and Monel Metal.
No. 3 for All other metals.
Write for details.

Distributors write us.

FLAME-PRUF
Ideal protection for welders' clothes.
Odorless, low cost, easy to use.
Write for details.

THE WOLFE-KOTE CO.

SHEBOYGAN • WISCONSIN

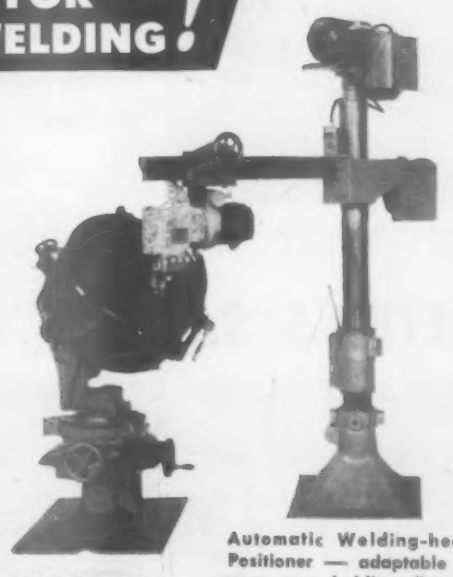
See THIS FIXTURE FOR AUTOMATIC WELDING!

A BIG TIME SAVER!

THIS Acme dual fixture arrangement permits practically constant use of an automatic welding head, because one of the fixtures can be reloaded while the other is engaged in the welding operation.

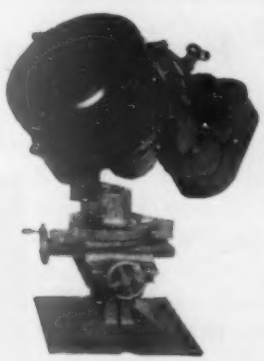
The holding machine can be set to revolve at any angle from vertical to horizontal. (Illustration shows a wheel being welded at 45° angle.) Positioner arm swings from one fixture to the other, locking in proper position. Speed of rotating the work is adjustable, as desired.

WRITE
for information relating to your particular welding fixture problem



Automatic Welding-head Positioner — adaptable to your own holding fixture.

Reloading Is Done During Welding Operation



ACME Manufacturing Co.

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SEND FOR DETAILS
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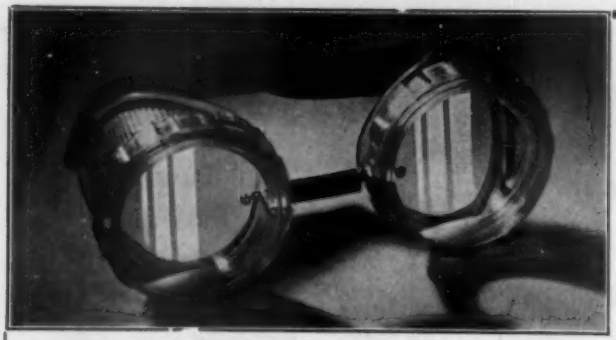
LARKIN
SPOT WELDERS
FROM
10-50 KVA
MANUAL, AIR AND
MOTOR OPERATED
MACHINES.
LARKIN A.C. ARC WELDERS
FOR EVERY NEED

● LARKIN MODEL # R 12

LARKIN LECTRO PRODUCTS CO., MANUFACTURERS
220 Taaffe Place, BROOKLYN 5, N. Y. ● Sales offices throughout the country



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NEW
TRANSPARENT
Chipping and Grinding
GOGGLE

Presenting
TWO OF METRO'S SAFETY "6"

METRO'S
TRANSPARENT
Chipping and Grinding
COVERALLS

Metro Manufacturing Co. Long Island City 1, N. Y.

Grinding-Wheel Markings

A 4 by 4 in. folder from Norton Co., Worcester 6, Mass., describes a method of marking diamond grinding wheels in order to bring their markings as nearly as possible into line with the new marking system for grinding wheels adopted by members of the Grinding Wheel Manufacturers' Association. The Norton diamond-wheel marking system includes seven positions describing the following characteristics: type of abrasive (D for diamond), grit size, grade, diamond concentration, bond, bond modification, depth of diamond section.

» «

Labor-Utilization Procedures

Absenteeism, labor turnover, training and upgrading, working hours, shift schedules, wage structures, worker supervision and other important problems of the present day are discussed in Bulletin No. 807, "Improvement of Labor-Utilization Procedures," a 52-page, 6 by 9 in. booklet published by the United States Department of Labor. Written from the standpoint of plant management, this booklet should be of value to employers in search of improved labor-utilization procedures. A copy may be obtained for 10c from the **Superintendent of Documents,** U. S. Government Printing Office, Washington 25, D. C.

» «

Thickness-Gauge Information

An eight-page, letterhead-size bulletin, GEA-4363, is published to explain the operation and advantages of General Electric thickness gauges. These gauges quickly measure the thickness of nonmagnetic material on magnetic iron and steel. Hence the waste of parts by destructive test methods is eliminated. **General Electric Co.,** Schenectady 5, N. Y.

» «

Soldering-Tool Folder

Ideal "Thermo-Grip" electric soldering tools are described and pictured in a 17 by 17 in., two-color folder just published. The line includes tools for practically every kind of soldering job—light or heavy duty. An electric brazing and silver soldering outfit is also described in this mailing piece. **Ideal Commutator Dresser Co.,** 1292 Park Ave., Sycamore, Ill.

» «

Metal-Cleaning Folder

Bulletin 4-D-1, a four-page letterhead-size folder from **Optimus Detergent Co.,** 248 Church St., Matawan, N. J., announces a line of industrial metal-cleaning materials designed to cover a wide range of specific applications. Emphasis is placed on the use of the proper detergent in conjunction with the correct cleaning method. The products described include alkaline, acidic, solvent and emulsion types of detergents.

Before

— *Safe and Easy*

TAKE A TIP – USE "TIP CLEEN"

Due to the extreme heat of the torch, impurities and deposits settle in the nozzle and in time clog it up.

Tip Cleen Removes these deposits Easily . . . WITHOUT HARM TO THE TIPS.

Tips already thrown into the discard because their clogged condition made cleaning seem impossible Have Been Cleaned Easily With Tip Cleen.

Just Think Of The Economy . . . Not Only In The Number Of Tips Saved But Also In Labor And Delays!

Save-------Time-------And--------Money

New, Simple, Easy . . . No Harm to Tips

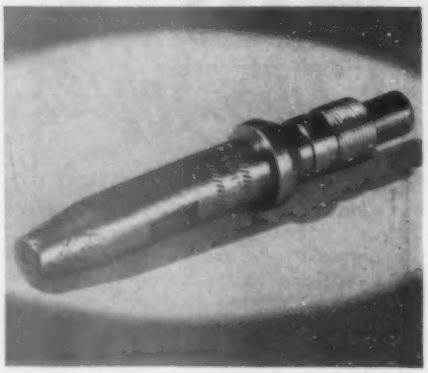
Old methods frequently used Strong and Injurious Acids . . . Tip Cleen Is absolutely Non-injurious to the tips. Drills have been used, but they injure the passages by breaking off and by changing the tapered tolerances.

To clean Tips by this new method, merely heat Tip Cleen to 150 degrees Fahrenheit, drop in tips for four hours, remove tips and rinse in cold water. THEY WILL BE AS CLEAN AS NEW . . . No impurities will remain in the air passages . . . It will shine like a new rifle barrel.

Be Convinced At No Cost To Yourself . . . Send For A Free Sample Today.
Weight approximately 50 lbs. per shipping case. Packed in gallon containers 4 to the shipping case.

SHEBOYGAN **WOLFE-KOTE CO.** WISCONSIN

Makers of CORE CLEEN, CARBON CLEEN, GREASE CLEEN



After

EASY-FLO RINGS

"WED" METALS TOGETHER FOR KEEPS

It's the fashion today to join metals with preplaced rings of EASY-FLO silver brazing alloy wire—first, because low-temperature EASY-FLO means fast, reliable, low-cost brazing—second, because preplacing the alloy speeds production, gives accurate control of amount of alloy and assures uniform distribution throughout a joint—and finally, because metals joined by EASY-FLO will never be parted by vibration, shock or extremes of temperature. They're one for keeps. START NOW to get the benefit of EASY-FLO's speed, reliability and economy in your metal joining operations present and future. BULLETIN 12-A tells you how. Write for your copy today.

EASY-FLO fabricated Air Speed Indicator Part. 6 joints in upper assembly brazed simultaneously—then 10 in lower. EASY-FLO rings preplaced at all joints.

STEEL SALES CORPORATION

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5 TAILOR-MADE WELDING ELECTRODES for THE BUILDING UP OR REPAIRING OF DIES, CUTTING TOOLS, CHISEL EDGES, ETC.

AGILE Silver Series

SILVER-GREEN . . . These electrodes are recommended for the tipping of chisels or beating tools. The qualities of the weld metal are unsurpassed for the repairing and restoring of damaged or worn dies.

SILVER-RED . . . The cutting edges built up by the deposit of these particular electrodes will compare in performance to that of expensive high speed cutting tools.

SILVER-BLUE . . . The deposited weld metal is an alloy steel which possesses the properties of high hardness, great wear resistance, durability and a minimum coefficient of expansion during heat treatment.

SILVER-YELLOW . . . These electrodes can be successfully used in the building or reclaiming of various dies and cutting tools, reamers, bushings, gauges, plugs, etc.

SILVER-BLACK . . . The weld metal of these electrodes possesses maximum hardness, is heat resistant and performs successfully under condition of extreme wear and corrosion.

Write for Catalog TODAY

AGILE ACTARC

AMERICAN AGILE CORPORATION
5806 HOUGH AVE.
CLEVELAND 3, OHIO

News of the Industry

OPA Simplifies Pricing of Machines, Prices, Repairs

Pricing of machines, parts, industrial equipment, industrial services and industrial machinery repair services has been simplified by the Office of Price Administration by the issuance of a new regulation and the revision of an old one. This action, which became effective on March 31, did not change the general level of maximum prices for the commodities and services.

The newly issued Maximum Price Regulation No. 581, covering machines, parts and industrial equipment, applies to all jobbing shop operations in the fabrication of metals and metal products, all jobbing shop operations in the treatment, coating or finishing of metals and metal products and plating on plastics and other non-metallic materials. The repair and maintenance of machinery and industrial equipment are included but not automotive, construction, road maintenance and farm equipment repairs.

March 31, 1942, is the pricing base date of the new regulation, and differentials in price among classes of service purchasers will be determined on the basis of a supplier's published price list of that date. If the supplier did not have a published price list on March 31, 1942, the maximum price is the highest at which he sold a service (supplied more than once) between Jan. 1 and March 31, 1942, adjusted to show differentials among classes of purchasers.

Maximum Price Regulation 136 has been streamlined into a shorter, simpler regulation for determining machine, parts and equipment prices, OPA declares. Although the revised regulation does not change the general level of maximum prices, it does change somewhat coverage, reports, records, pricing methods and depreciation classifications for second-hand products. The changes were planned to lessen rather than to add to the wartime demands on industry.

» «

Black Mfg. Co. to Offer New "Black Arrow" Line

As announced in THE WELDING ENGINEER last month (page 82, April issue), The Alexander Milburn Co., Baltimore, has been taken over by the newly organized Black Mfg. Co. Further details concerning the transaction are now available. S. Duncan Black, Jr., the president of the new organization, is the son of the president of the Black & Decker Co., well known manufacturer of portable electric tools.

The new company will operate under existing patents and patents pending of the former Alexander Milburn Co. and will market the "Black Arrow" line of gas cutting and welding equipment and spray guns through a selected group of industrial and welding supply distributors and automotive jobbers in the automotive field. The line will be constantly improved and expanded, promises President Black, and the efforts of "Black Arrow" distributors will be supported by sales and service representatives as well as by national and local sales promotion and advertising programs.

» «

Resistance Welders Called Critical Equipment by WPB

An amendment of General Industrial Division Table 6, Order M-293, designed to speed up delivery of the more essential unfilled rated orders for certain types of equipment, including resistance welders, was announced last month by the War Production Board. Under the amendment, Subdivisions 13 and 14 of Table 6 are combined. Subdivision 14 covers resistance-welding equipment. WPB said that the demand for this item is critical, largely because of new military programs. Manufacturers have average backlogs of six or seven months. A substantial portion of the high rated orders on their books are for maintenance, repair and operating supplies.

» «

Babcock & Wilcox Will Make Atomic-Hydrogen Welded Tubing

The Babcock & Wilcox Tube Co., Beaver Falls, Pa., a firm long associated with the manufacture of seamless stainless-steel tubing, is expanding its facilities to include the manufacture of atomic-hydrogen welded tubing and pipe. The rotary piercing method, company executives explain, is eminently suited for large diameters and heavy-walled tubing, but the atomic-hydrogen process is better suited for smaller sizes of tubing such as are used in the food and chemical industries. Subsequent processing—annealing, pickling, cold drawing and straightening—is identical in both methods.

» «

Two New Navy Movies: "Fortress Japan," "LVT"

Two new Navy motion pictures have been announced for showings to war plant audiences by Rear Admiral Clark H. Woodward, chief of the Navy's Industrial Incentive Div., 2118 Massachusetts Ave., N.W., Washington, D. C. These are: "Fortress Japan," which reveals the modern industrial structure and strength of the Mikado's empire, and "LVT—The Beachbuster," the story of the Marine Corps' versatile amphibian tractor, which played a key role in the invasion of Iwo Jima and other Pacific islands.

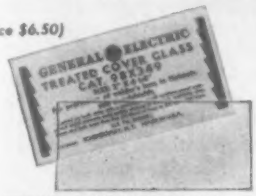
For Greater Safety ★ Superior Welding

USE G-E WELDING ACCESSORIES

VENTILATED HELMET

(Cat. No. 87X578) Equipped with a crown sheet for skull protection, this helmet features screened ventilators which provide cool comfort and prevent fogging of the glass. Included also are eye-protective lens, lens gasket, clear cover glass, adjustable chin rest, head gear, snap-on sweatband.

(List Price $6.50)



TREATED COVER GLASS

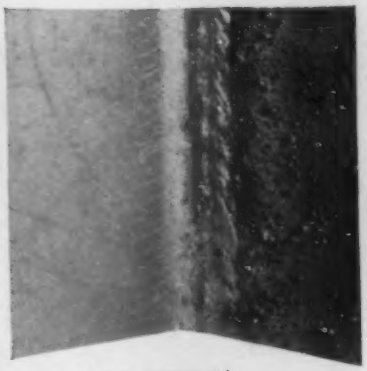
(Cat. No. 98X349) Coated on both sides with a tough, transparent, moistureproof compound this cover glass helps to maintain clear vision and is highly resistant to weld-spatter. Efficiency of coating gives this glass many times the life of an untreated glass.

(List Price $0.10)

FILLET-WELD GAGE

(Cat. No. 92X512) A necessary tool for both operators and inspectors, this handy fillet-weld gage provides a quick, accurate means of gaging fillets which have a straight, concave, or convex contour of the following sizes: ¼ in., 5/16 in., 3/8 in., 7/16 in., ½ in. and 5/8 in.

(List Price $1.25)



G-E GLYPTAL*

No. 1294—Weld-spatter Preventive Coating. A single coating of No. 1294 prevents adhesion of weld-spatter for either singlepass or multipass welds. Especially suitable when fabricating stainless or special alloy steels.

(List Price per gal. $1.80)

*Trade-mark Reg. U.S. Pat. Off.

OTHER G-E WELDING ACCESSORIES

Gloves • Lenses

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Cable connectors

Electrode holders

Leather clothing

General Electric Company
Schenectady 5, N. Y.

BUY WAR BONDS

GENERAL ELECTRIC

The Right Fluxes Are The Most Important Part of Your Metal-Joining Job

Krembs FLUXINE Fluxes are the answer. They are highly concentrated. That is why they are so economical to use and so effective, even though they cost a little bit more. They go four to five times further than any other competitive fluxes. They are all flux . . . no waste material added. They do not bubble, wriggle, blow or chip off the rods when heat is applied. They produce strong, non-porous joints . . . do not cake or deteriorate. They are the result of 70 years of experience.

You can get more and better brazing, silver soldering and welding from Krembs FLUXINE Fluxes. You will be surprised how far they go. Try them just once. You will see the difference immediately.

Ask your Jobber. If he handles our FLUXINE Fluxes, he has your best interests at heart. He knows the FLUXINE line produces the best results with the greatest economy.

Write for chart which shows the FLUXINE Fluxes to use for your metal-joining problems.

KREMBS & COMPANY

Est. 1875

Dept. G, 669 W. Ohio St. • Chicago 10, Ill.

FLUXINE

TRADE MARK REGISTERED U.S. PAT. OFF.

DE-STA-CO Model 605

"PUSH AND PULL LOCK" CLAMP

Especially well suited for locating and indexing, fills a definite need on many jigs and fixtures. Work end (plunger rod) is tapped to receive standard bolt, which provides quick adjustment to suit the job at hand. Quickly converted from "push" to "pull" action or vice versa.

Bulletin No. 43 details this and many other labor saving De-Sta-Co toggle action clamps. Send for your copy.

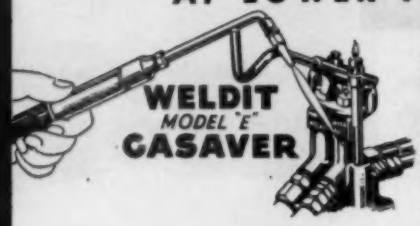
DETROIT STAMPING CO.

Established Over 25 Years

372 Midland Ave • Detroit 3, Mich.

Safe Welding

AT LOWER PRODUCTION COSTS



The Weldit Gasaver shuts off the welding flame when not in use. . . . Conserves essential materials by cutting oxygen and acetylene consumption as much as *fifty* per cent. Prevents injury to workmen—or sudden fires—from dangerous idle torch flames. . . . Adjustment remains unaltered between welds.

When the Weldit Gasaver has been installed, you simply hang idle torch on the handy lever rod. Weight of torch pulls rod down, thus automatically shutting off supply lines. Relight instantly by passing torch over Gasaver pilot light. No bother. . . . No time lost. . . . *No readjusting required.* . . . Price $10.00 at Detroit. Order today.

Better Soldering, Annealing and Heating Jobs

The Weldit Model CW Blowpipe is in daily use by many foremost industrial plants. . . . Built in accordance with the recommendations of leading fabricators of sheet metal products. . . . Operates on either natural gas, manufactured gas, or other low temperature fuel gas and compressed air. Stands up under rough shop use. . . . Send for literature.

WELDIT ACETYLENE CO.
628 BAGLEY AVENUE · DETROIT 26, MICH.

SUPER–WETTING
KWIKFLUX
SPEEDS PRODUCTION

Fast Flowing . . . No Lumping or Pitting of Solder

MEETS ALL RIGID SPECIFICATIONS

KWIKFLUX accomplishes 25% to 50% higher wetting action than the fluxes now on the market, and has almost 100% higher penetration in deep joints. It works perfectly with direct gas flame, hydrogen, acetylene —Muffle (direct or indirect) and induction heating. KWIKFLUX is used for brazing, hard soldering and welding of Stainless Steel, Iron, Copper, Brass, Bronze, Platinum, Gold, Silver, Monel Metal, Nickel, German Silver and other ferrous or non-ferrous metals and alloys. It will not blacken brass or copper, and is suited to either automatic or manual operations. Fast, efficient action assures improved quality and finish.

TESTED AND PROVEN BY PROMINENT USER OF FLUXES

"KWIKFLUX has proven far superior to other fluxes due to the ease with which the excess material may be removed after brazing, that it is also necessary to use very much less quantity, and that it is much easier on the eyes, throat and hands." (Name on request)

WRITE FOR LITERATURE

Data sheets describing KWIKFLUX in detail — advantages, properties, characteristics and price—will be sent promptly on request. There is no obligation.

OUR NEW 1945 PRICE SCHEDULE PLACES KWIKFLUX ON AN ALL-INCLUSIVE COMPETITIVE BASIS

Advantages:

(1) Perfect with both Low and High Melting Point Hard Solders.
(2) Excess Flux washes off clear in hot water —saves cleaning and finishing time.
(3) Does not lump or pit solder. Forms smooth film easily washed off, leaving surface beneath bright and shiny.
(4) Faster, Fluxing Actions—saves time, gas and electricity.
(5) Fumes are fixed because KWIKFLUX is neutral. Increases production efficiency.

SEND FOR FREE TRIAL JAR

For more than 12 years, our tested research improvements have been passed on to our customers. This service has been in operation during the war period.

KWIKFLUX

SPEC

SPECIAL CHEMICALS CO.
30-36 IRVING PLACE, NEW YORK 3, N. Y.

Chicago Technicians Hold Their 4th War Production Conference

Thirty-six panel sessions, including two on welding, featured the fourth annual War Production Conference held at the Stevens Hotel, Chicago, on March 29. The conference was sponsored by the Chicago Technical Societies Council, and the two welding sessions were sponsored by the Chicago section of the American Welding Society.

C. G. Bassler, district manager of Taylor-Winfield Corp., was chairman of the session on resistance welding, and T. B. Jefferson, editor of THE WELDING ENGINEER, was chairman of the session dealing with arc and gas welding and brazing. Other members of the Chicago AWS section made material contributions to the success of the conference. Eric R. Seabloom, Crane Co., served as co-chairman of the conference and in addition presented a paper on hard-facing for performance at high temperatures in a panel sponsored by the American Society for Metals. Leslie S. McPhee, Whiting Corp., was chairman of the exhibit committee of the conference, and Irving Carlson, Crane Co., was chairman of the welding panels.

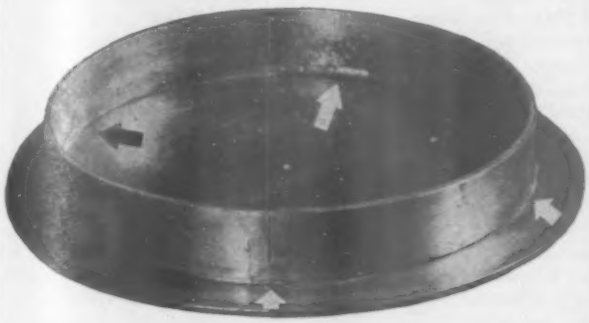
The session on resistance welding saw a movie, "Electronics at Work," provided through the courtesy of Westinghouse Electric and Mfg. Co., and listened to papers presented by C. L. Pfeiffer, electrical engineer, Western Electric Co., Carl Otto, process engineer, Douglas Aircraft Corp., William Boese, welding engineer, Pullman Standard Car Mfg. Co., and T. R. Lawson, manager control section, Westinghouse Electric and Mfg. Co. The meeting closed with a panel discussion conducted by James Cooper, sales engineer, National Electric Welding Machine Co.

At the other welding session, Chairman Jefferson gave a brief talk outlining recent developments in welding and brazing and the importance of welding in the war effort. Following this, he acted as moderator at an "information please" session with a board of experts on hand to answer questions relating to various welding, cutting and brazing problems presented by the audience. Members of the latter board were: L. S. McPhee, welding supervisor, Whiting Corp.; M. H. Wigton, research engineer, Bastian-Blessing Co.; R. L. Kohlbry, vice-president, Machinery and Welder Corp.; W. C. Pearson, welding supervisor, Westinghouse Electric & Mfg. Co.; E. R. Seabloom, supervising engineer, Crane Co.; J. B. Quigley, welding engineer, Graver Tank & Mfg. Co.; Dudley Rice, sales engineer, Eutectic Welding Alloys.

» «

Dresser Industries, Inc. in New Cleveland Office

Centralized administrative offices of Dresser Industries, Inc., formerly at Bradford, Pa., are now in new quarters at 1138 Terminal Tower, Cleveland, where the concern occupies some 5,800 sq ft of floor space. Dresser Industries is the parent corporation of 13 member companies. Newest members of the group are the Payne Furnace Co. and Kobe, Inc., both of California. Another California company, Day & Night Mfg. Co., is in the process of acquisition.



KRE-CO ALUMINUM BRAZING ELIMINATES WELDING PROBLEMS

KRE-CO ALUMINUM BRAZING PROCESS makes brazing possible at a temperature safely below the melting point of the parent metal. It Speeds production—Reduces finishing costs—Cuts rejections to a minimum—Lowers gas consumption—Halves new operator training time. Makes a perfect bond. The process includes the use of KRE-CO ALUMINUM BRAZING FLUX and a standard 5% Silicon Rod. Send for Bulletin M 2.

KRE-CO MULTICHEMIC FLUX
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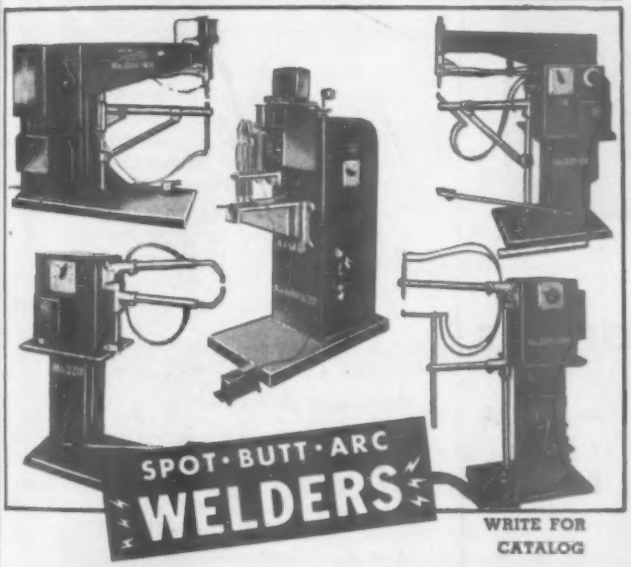

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We manufacture a complete line of resistance spot welders from ¼ to 300 KVA for all types of welding. There is an EISLER WELDER for every purpose.

TRANSFORMERS OF ALL TYPES

WE INVITE CONTRACT SPOT WELDING IN LARGE OR SMALL QUANTITIES.

CHAS. EISLER
EISLER ENGINEERING CO.
749 SO. 13th ST. NEWARK N. J.

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1—BREAK IT DOWN... OR 2—RADIOGRAPH IT!

(CANADIAN RADIUM HAS BEEN KNOWN TO PAY FOR ITSELF ON A SINGLE JOB!)

The "break-down" method consumes time, labor and vitally needed material—a practice that appears primitive compared with modern radiography. A radium capsule (you can rent or buy) and a supply of films are all you need to locate and clearly identify all types of internal flaws in castings and welds. Radium is compact, portable—requires no power, no attachments, no repairs, no "servicing." Readily available in units suited to the needs of your plant.

R-144

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Reliable, profusely illustrated 80-page textbook on the fundamentals and technique of modern industrial Radiography of Metals with Radium. Specially prepared for the metals industry by our research and technical staff. Write for your copy today, giving your name and company position.

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CORPORATION
630 FIFTH AVE., ROCKEFELLER CENTER, NEW YORK 20, N.Y.

Champion Celebrates Its 50th Anniversary

The Champion Rivet Co. last month celebrated the 50th anniversary of its founding. With plants at Cleveland and at East Chicago, Ind., the company manufactures a complete line of mild-steel welding electrodes as well as its older product, rivets.

» «

ASA Begins War Standards for Engineering Drawings

At the request of the War Production Board, the American Standards Association is now developing a series of American War Standards, object of which is to correlate the drawing and drafting room practices of the Army and Navy with those of industry. Marked economies will result from this work, say Army and Navy spokesmen, who have long felt that the existing diversity of drafting practices between the Armed Forces and industry has caused waste and confusion and delays in providing the drawings needed for war equipment.

The scope of the work will include civil, mechanical, electrical, aeronautical and marine engineering. The following subjects will be covered: (1) abbreviations, (2) methods of indicating and specifying threads, (3) methods of lettering, (4) drawing forms and sizes, (5) graphical, diagrammatic and schematic symbols, (6) methods of indicating and specifying materials, (7) methods of indicating and specifying finishes, (8) methods of dimensioning and indicating tolerances, (9) methods of numbering drawings.

» «

Welded Alligators Landed at Okinawa

The newest and most deadly of all "Alligators"—all-welded amphibious tanks—saw action for the first time at Okinawa, Graham-Paige Motors Corp. disclosed last month in announcing that it has produced almost 1,500 amphibians. The newest Alligator, the hitherto secret LVT-3, has tremendously increased fire power, heavier armor and is faster on both land and water than the LVT-4, which played a major role in the landings at Tarawa, the Philippines and Iwo Jima. Like its predecessor, it is able to climb over coral reefs and other obstacles which severely handicap other types of landing craft.

Graham-Paige Motors Corp. has also announced production on an order for 120,000 units of 76 mm high-velocity armor-piercing shot, a type of ammunition which has received one of the highest urgency ratings. The order is scheduled for completion in January, 1946.

» «

Salkover Co. Offers Consultation Service

Salkover Metal Processing, which operates commercial electric brazing plants in Chicago and Long Island City, has entered the field of design and method consultation, according to an announcement by Lawrence Jacobsmeyer, manager of the Chicago plant. The new service is intended to assist companies which: (1) are located so far from the Salkover plants that shipment is impracticable and (2) have such great volume that handling the work on a commercial basis is economically unsound.

For the time being, the consultation service will be confined to the Chicago plant.

» «

Three Firms to Build 24 Coastal Tankers

Contracts for construction of 24 coastal tankers of the T1-M-BK1 type were recently awarded by the United States Maritime Commission to the three lowest bidders. These were the United Concrete Pipe Co., Long Beach, Calif., the New England Shipbuilding Corp., South Portland, Me., and the Avondale Marine Ways, Inc., Westwego, La.

» «

New Smithway Distributor

Whitehead Metal Products Co., New York City, has been appointed eastern distributor for Smithway welding electrodes, manufactured by the A. O. Smith Corp. Complete stocks will be carried in the Whitehead company's seven warehouses in New York City, Philadelphia, Boston, Newark, Buffalo, Baltimore and Syracuse.

AUTO-LITE Pressure Gauges

OPERATORS who cut, treat or join metals by oxy-acetylene flame processes have the assurance and protection of proper pressures when their equipment includes Auto-Lite Pressure Gauges.

These gauges save man hours, serve to hasten essential production and conserve vital gases through precise pressure indication. Designed and manufactured by pioneers in the development of dial-type precision instruments, Auto-Lite Pressure Gauges are standard equipment for oxy-acetylene apparatus, and are listed as approved by Underwriters Laboratories.

THE ELECTRIC AUTO-LITE COMPANY
INSTRUMENT AND GAUGE DIVISION
CHRYSLER BUILDING, NEW YORK 17, N. Y.

FACTORY LA CROSSE, WISCONSIN

National
Carbide

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EFFICIENT

ECONOMICAL

DEPENDABLE

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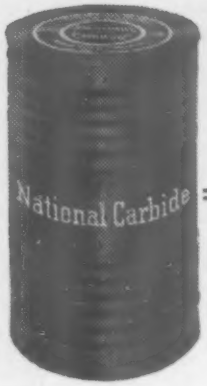

For
Welding and Cutting
Specify

NATIONAL CARBIDE IN THE RED DRUM

•

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Cast
Welding Rods

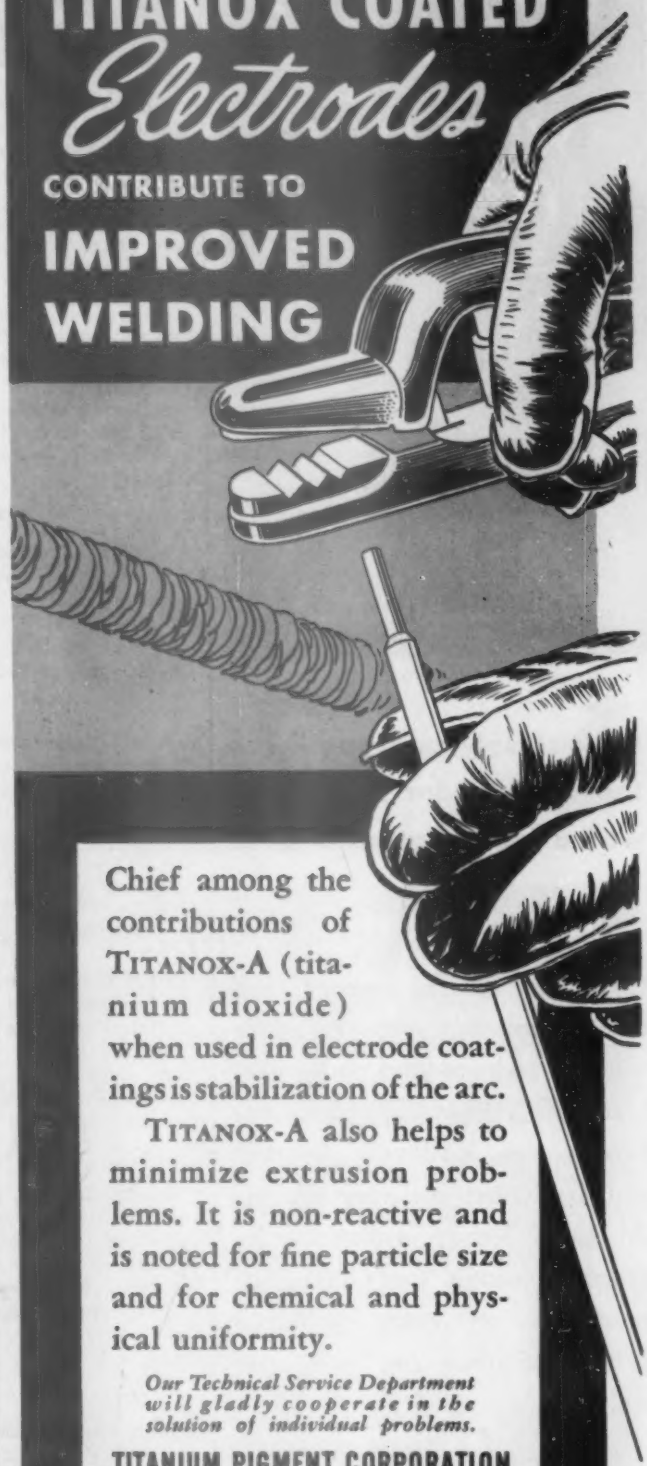
The Standard of
QUALITY
THROUGHOUT THE WORLD

Cast Aluminum Welding Rods
of Standard Analysis

Plain and alloyed Gray Iron
Welding Rods and Electrodes

THE CHICAGO HARDWARE FOUNDRY CO.
Dependable Since 1897
545 ENGINEERING BUILDING
NORTH CHICAGO, ILLINOIS

TITANOX COATED
Electrodes
CONTRIBUTE TO
IMPROVED
WELDING



Chief among the contributions of TITANOX-A (titanium dioxide) when used in electrode coatings is stabilization of the arc.

TITANOX-A also helps to minimize extrusion problems. It is non-reactive and is noted for fine particle size and for chemical and physical uniformity.

Our Technical Service Department will gladly cooperate in the solution of individual problems.

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111 Broadway, New York 6, N. Y.
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350 Townsend St., San Francisco 7, Cal.
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TITANOX

TITANOX

What's Wrong WITH THIS PICTURE?

Look closely and you'll see that the welder is working with a weld-spattered cover glass.

Changing glasses means lost time. Spattered glasses reduce welding footage and cause eye-strain. THERMACOTE Cover Lenses are positively spatter-proof—outlast ordinary glasses 25 to 1, reduce eye-strain, increase footage and insure as much as an extra half-hour production time per day—per welder.

THERMACOTE CO.

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612 No. Michigan Ave. 11, Chicago, Ill.
1101 McLaughlin Blvd. Portland 2, Ore.
420 South San Pedro Street
Los Angeles 13, California

ABOUT PEOPLE

Colonel H. A. Toulmin, Jr., has been elected chairman of the board and president of The Hydraulic Press Mfg. Co. of New York City and Mount Gilead, O. A member of Toulmin & Toulmin, lawyers of Dayton, O., and Washington, D. C., Colonel Toulmin will continue the practice of law. He has recently returned from 2½ years with the Army, where he served as assistant chief of transportation, Transportation Corps, in charge of building the Army's navy and railroads. He was recently awarded the Legion of Merit for having reached the highest level of industrial production in these fields in the history of the industry.

» «

Howard F. MacMillin, former president of The Hydraulic Press Mfg. Co., has been elected president of its subsidiary, The H-P-M Development Corp., and will devote his attention to the research work of that corp.

» «

Albert Reichmann, chairman of the Chicago section of the American Welding Society during the 1936-37 season, been elected to an honorary membership in the Western Society of Engineers. Mr. Reichmann was vice-president of the American Bridge Co. until his retirement in 1938.

» «

John E. Ponkow, formerly chief electrical engineer and supervisor of experimental engineering for the Federal Machine and Welder Co., Warren, O., has been appointed sales manager. Mr. Ponkow joined Federal in 1941 as assistant chief electrical engineer.

» «

Emery Garriott, formerly weldrod development engineer of A. O. Smith Corp., has joined Ampco Metal, Inc., Milwaukee, as "Ampco-Trode" development manager. **E. J. Sorensen,** until recently assistant field service manager of the "Ampco-Trode" department, has become field service manager.

» «

John Paul Aprea has been appointed advertising and public relations director of the Eutectic Welding Alloys Co. He was advertising and sales promotion manager for the National Manufacturing Corp., Tonowanda, N. Y., prior to his recent discharge from the Armed Forces.

» «

Albert W. Nelson has been appointed assistant manager of sales for the New England district of American Steel & Wire Co. He formerly covered the western Michigan territory.

J. M. Morrison, representative of Ampco Metal, Inc., Milwaukee, has established a field engineering office at 818 McGhee Ave., Knoxville 17, Tenn., from which he will serve the states of Florida, Georgia, Tennessee, North and South Carolina. His previous address was at Jacksonville, Fla.

» «

E. J. Flood has been appointed general district sales manager for the Chicago sales territories of American Chain & Cable Co., Inc. He has been with the company for 25 years in the Page Steel and Wire and American Chain divisions and will continue his headquarters at 400 West Madison St., Chicago.

» «

E. P. Jones, formerly development engineer with The Linde Air Products Co., has resigned to become general superintendent of the Pressure Weld Co., Houston, Tex. Mr. Jones has been closely associated with the development of the oxy-acetylene pressure welding process.

» «

O. B. J. Fraser, F. L. LaQue and **Donald J. Reese** have been selected to head three newly created sections of the development and research division of The International Nickel Co., Inc. Mr. Fraser heads the industrial chemicals section, continuing also as director of technical service of International Nickel's mill products, a position he has held since 1934. Mr. LaQue is in charge of the corrosion engineering section; he has been engaged since April, 1940, in development activities on applications of both ferrous and non-ferrous nickel-containing alloys. Mr. Reese, heading the iron and non-ferrous casting section, will coördinate more closely the company's development work on cast iron, malleable iron, cast brass and bronze. He has recently resumed his duties with the company's development and research division after having been with the steel division of the War Production Board for almost three years.

» «

Myron E. Capouch has been appointed assistant manager of the wire rope and construction materials division of the American Steel & Wire Co., succeeding **B. S. Pease,** who retired after 36 years of service. Mr. Capouch was formerly assistant manager of the electrical and wire rope department in Chicago.

» «

Clarence E. Wynn, formerly assistant manager of industrial relations, has been made manager of industrial relations of the Tubular Alloy Steel Division of National Tube Co., Gary, Ind. He succeeds **Gray D. Hobby,** recently transferred to take a corresponding position in the company's Lorain works.

» «

Ernest Kanzler of Detroit and **M. P. Ferguson** of South Bend, Ind., have been elected to the board of directors of Bendix Aviation Corp.

R&IE

LIVE LINE CLAMPS

Make Hi-Pressure, electrically and mechanically solid contact. Used extensively on live overhead power lines for—

- Cutting out a section of line for repairs
- Grounding circuit or feed lines
- Temporary feed lines
- Isolating equipment

Other clamps are — connectors, terminals, taps, etc.

RAILWAY AND INDUSTRIAL ENGINEERING CO.
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CONNECTORS for WELDING CABLE and TERMINALS

3 SECONDS to Hookup—
Lengthen · Shorten · Replace

They speed up production, save hours of time and end delays. Make short cables reach farther. Connect or disconnect instantly for shift to any job in shop or field. Used by America's Leading Industries.

Ideal For All Types Conductor Cable

Such as welding, supply lines, ships, electric cars, mining operations, etc. Standard opening fits 1-1/0-2/0-3/0-4/0 cable. Designed for positive locking and highest conductivity. Also types for panel, bus, angle and multiple hookups.

SOLDER OR SOLDERLESS TYPE
TYPE F A Female Connector for Angle Mounting
TYPE F P Female Connector for Panel Mounting
TYPE F S Female Half Connector
TYPE M S Male Half Connector
TYPE M F S Complete Cable Connectors

Write for Circular describing complete line, also price list

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Manufacturers of PALMGREN PRODUCTS for Over 35 Years
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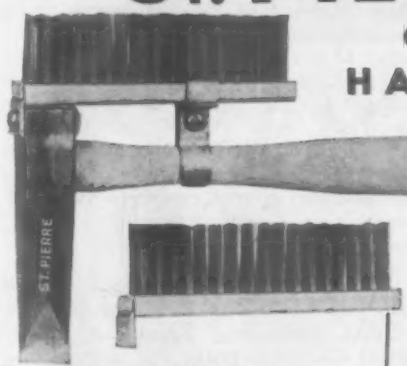
ABUSE MEANS NOTHING TO ST. PIERRE

CHIPPING HAMMERS



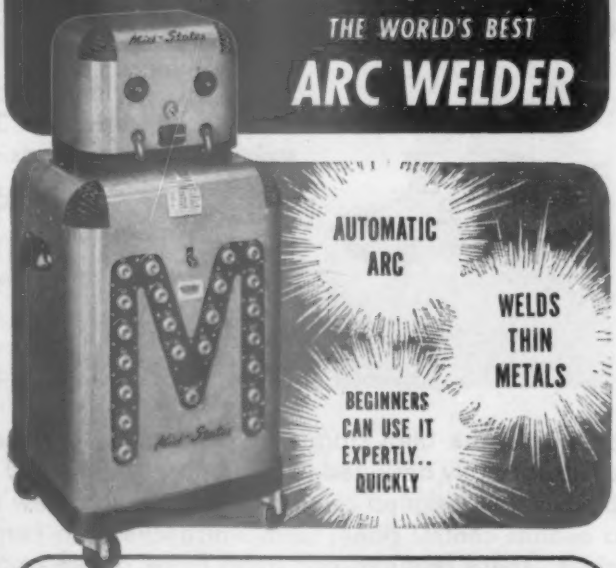
Here's a man-sized brush in the right position for easy use after chipping scale from welded surface. Hammer-Chisel made of highest quality tool steel. Entire tool is well-balanced. For economy, for durability use ST. PIERRE Hammers.

Breaks the Scale
Cleans the Surface
in One Operation

Order Today From Your Jobber or Direct

ST. PIERRE Chain Corporation
WORCESTER DROP FORGINGS MASSACHUSETTS

Mid-States METAL ZIPPER
THE WORLD'S BEST ARC WELDER



..... AND MANY OTHER FEATURES
NOT FOUND IN ANY OTHER TYPE OF WELDER
Sold by Leading Jobbers Everywhere
WRITE FOR NEW FREE BULLETIN JUST OFF THE PRESS

Mid-States EQUIPMENT CORP.
2431 South Michigan Avenue Chicago 16, Illinois

Now! splice your WELDING CABLE

Easily — Quickly — without Soldering or Rigid Connections

with the

PUNCH-LOK

Streamlined

BANDING METHOD

Punch-Lok Clamp

Loking Tool

Punch-Lok Clamps and Loking Tool will splice that broken cable. You can tie, reinforce, connect, mend and make scores of other applications. Easy, fast, safe, economical. No normal pull strain can tear it loose. Punch-Lok Method will save you time and money.

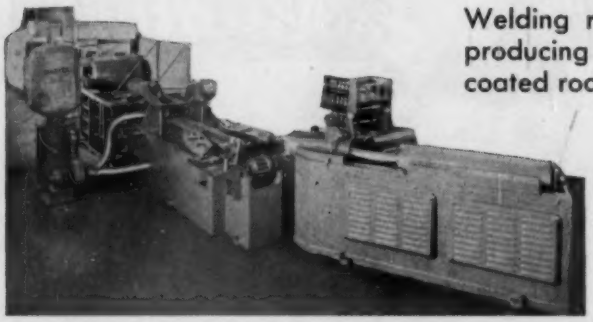
Write for descriptive catalog and name of nearest distributor.

KEEP BUYING WAR BONDS

PUNCH-LOK COMPANY

Dept. E, 321 North Justine Street, Chicago 7, Illinois

MOSLO'S NEW WELDING ROD PROCESSING PLANT



Welding rod processing plants producing 350 to 1000 flux coated rods a minute are a specialty at Moslo's. Every plant, regardless of size, is complete for welding rod production including all operations from flux mixing and wire cutting to the final stages of packaging. Among the new features are a specially designed extrusion press with a 60 degree die-head—a specially designed compact oven having a new transfer system and a central control panel from which one man can operate the entire plant. These features, and many more, assure smooth plant operation and the steady production of high quality welding rods.

Further information on request.

MOSLO MACHINERY CO.

2441 PROSPECT AVENUE **CLEVELAND, OHIO**

William S. James, formerly chief engineer of the Studebaker Corp., has been named director of automotive research for the Ford Motor Co., Dearborn, Mich. Mr. James is a past-president of the Society of Automotive Engineers and is nationally known for his research achievments in the industry.

» «

C. V. Briner, manager of the Gauge and Tool Div., Pipe Machinery Co., Cleveland, was elected president of the American Society of Tool Engineers at its recent thirteenth annual meeting in Detroit. Other officers are: **A M. Sargent,** president and general manager, Pioneer Engineering and Mfg., Detroit, first vice-president; **W. B. Peirce,** vice-president, research and development, Flannery Bolt Co., Bridgeville, Pa., second vice-president; **Thomas P. Orchard,** partner and general manager, American Tool Engineering Co., New York City, third vice-president; **A. M. Schmit,** general manager, A. M. Schmit Co., Toledo, O., secretary; **W. J. Frederick,** president, Frederick Steel Co., Cincinnati, treasurer; **W. A. Dawson,** chief master mechanic, The DeHaviland Aircraft of Canada, Ltd., Toronto, assistant secretary-treasurer.

» «

Arthur G. Sullivan, vice-president, Buffalo Fire Appliance Corp., Buffalo, was re-elected president of the Chemical Fire Extinguisher Association at its recent annual meeting. Other officers re-elected are: **J. O. Binford,** general sales manager, American-La France-Foamite Corp., Elmira, N. Y., vice-president; **Herman W. Diener,** George W. Diener Mfg. Co., Chicago, treasurer; **W. J. Parker,** W. J. Parker, Inc., New York City, commissioner.

» «

W. A. Elliott, formerly vice-president in charge of sales of the Elliott Co., Jeannette, Pa., was elected executive vice-president at the company's recent annual meeting. **Ronald B. Smith,** manager of engineering research and development, was elected vice-president in charge of engineering. **M. G. Shevchik,** secretary, was elected secretary and treasurer. **F. W. Dohring,** general sales manager, was given added responsibilities as assistant to the executive vice-president.

» «

Clair Book, formerly engaged in estate analysis work, has been appointed assistant purchasing agent for Lukens Steel Co., Coatesville, Pa., and its divisions, By-Products Steel Corp. and Lukenweld, Inc. **W. E. Mullestein,** who has been acting as assistant sales manager for Lukenweld, has been granted a leave of absence to serve in special overseas work with the U. S. War Department.

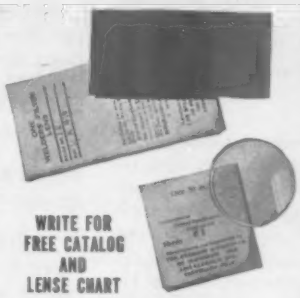
» «

F. S. Cockburn, who acted as Allis-Chalmers representative in Peru prior to the outbreak of the war, has been reappointed to this position.

Running Rings
AROUND YOUR
LENSE PROBLEM

Eye Gard LENSES and PLATES

Are you risking the eyesight of your workers, and the perfection of your work because of unsatisfactory welding lenses? Eye Gard Lenses, made by experts in the field of welding glass, come in a wide range of types and shades ...are bevelled to eliminate sharp edges and minimize chipping. Next time order Eye Gard Lenses and Plates... they cost no more, yet provide the utmost in eye protection.



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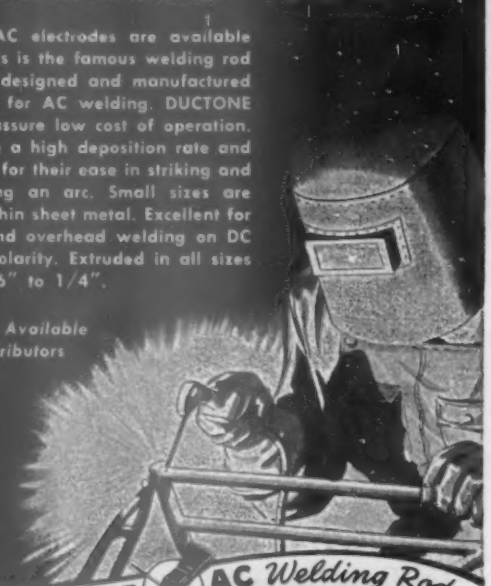
AMERICAN INDUSTRIAL SAFETY EQUIPMENT CO.
397 BRIDGE STREET • • BROOKLYN 1, N. Y.
DIVISION OF THE BURDETT OXYGEN COMPANY - CLEVELAND, OHIO

Best for AC General Purpose
DUCTONE AC
(E6011 AND E6013)
WELDING RODS

Ductone AC electrodes are available again. This is the famous welding rod that was designed and manufactured especially for AC welding. DUCTONE AC rods assure low cost of operation. They have a high deposition rate and are noted for their ease in striking and maintaining an arc. Small sizes are good for thin sheet metal. Excellent for vertical and overhead welding on DC positive polarity. Extruded in all sizes from 1/16" to 1/4".

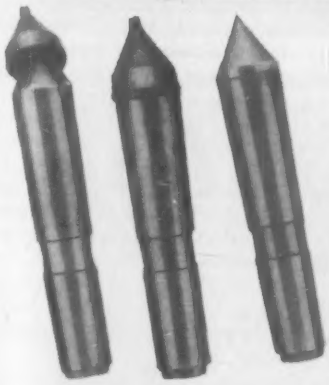
Territories Available for Distributors



Reach for DUCTONE AC Welding Rods

Chicago Steel and Wire Co.
103rd St. and Torrence Ave,
Chicago 17, Illinois

YOUR WORN
TOOL STEEL CENTERS
Can be Salvaged
by using
COLMONOY
TIPPING
SERVICE



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STOW MANUFACTURING CO.
7 Shear St., Binghamton, N. Y.

S. B. Heppenstall, Jr., has been elected vice-president of H. K. Porter Co., Pittsburgh. He was formerly vice-president in charge of sales of the Heppenstall Co.

» «

Bernard Gould, formerly in charge of dip tank sales, has been appointed general sales and advertising manager of the Aeroil Burner Co., Inc., West New York, N. J.

» «

Hendry Lars Bart, who has served as managing editor of a number of aeronautical and technical magazines, has joined the staff of the American Standards Association as director of public relations.

» «

E. C. Murdock has been appointed manager of a newly established Detroit factory branch of the Yoder Co., Cleveland. His offices will be in the Maccabees Building, Detroit. Mr. Murdock has handled sales and service on Yoder products in the Detroit area for many years.

» «

Marcel C. Boss, formerly an engineer with the staff of the Hanson-Van Winkle-Muning Co., has been appointed chief engineer in charge of design and production operations for the Optimus Equipment Co., Matawan, N. J.

Dr. J. R. Van Pelt, Jr., formerly technical director of the Museum of Science and Industry, Chicago, has joined the staff of Battelle Memorial Institute, Columbus, O. He will head Battelle's program of research education.

» «

Henry S. Freynik, who has been associated with the laboratories of the Riverside Metal Co., Riverside, N. J., for the past 21 years, has been promoted to the position of chief metallurgist.

» «

E. Peerce Lake, formerly vice-president and general manager of the Warren City Mfg. Co., Graham-Paige subsidiary at Warren, O., has been made general sales manager of Graham-Paige Motors Corp. **Glen L. Logan**, formerly assistant to the general sales manager of the Packard Motor Car Co., will be assistant sales manager of Graham-Paige.

» «

J. E. N. Hume, commercial vice-president and manager of the industrial divisions of the General Electric Co., and **J. W. Belanger**, manager of the federal and marine divisions, have been named assistant managers of sales of the company's apparatus department. **Karl H. Runkle** has been named manager of the industrial divisions to succeed Mr. Hume, and **R. S. Neblett** has been named federal and marine divisions manager to succeed Mr. Belanger. **W. V. O'Brien**, formerly assistant manager, has been appointed manager of the central station divisions, succeeding **H. V. Erben**, recently named assistant general manager of the apparatus department.

» «

John L. Young has been elected to the newly created position of vice-president in charge of engineering of the National Tube Co., U. S. Steel Corp. subsidiary. He was formerly vice-president of industrial research and development of the United Engineering & Foundry Co., Pittsburgh.

Died . . .

Professor Alfred B. de Forest, 56, president of the Magnaflux Corp., Chicago, died at his summer home in Marlboro, N. H., on April 5. A noted engineer and a member of the mechanical engineering faculty of Massachusetts Institute of Technology, Professor de Forest was probably best known for his development of the Magnaflux magnetic testing method for discovering defects in metal products. This method is used extensively for the non-destructive testing of welds. Professor de Forest was a member of the American Welding Society and other technical societies and many engineering honors had been conferred upon him, including the Modern Pioneer Award in 1940 in "recognition of meritorious service to industries and to mankind in the creation of numerous new industries and countless jobs."

» «

Weldon Roberts, pioneer in the manufacture of rubber erasers and soft rubber-bonded abrasives for metal finishing, died Sunday morning, March 25, in the Hotel Woodstock, New York City, at the age of 77. Until the time of his death he had served actively as president and chairman of the board of directors of the Weldon Roberts Rubber Co., Newark, a business which he had established in 1912.

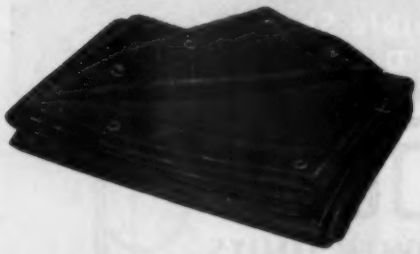
» «

George H. Wright, among the first to produce stainless steel and a contributor to many improvements in metals, died March 26 at the age of 62. Mr. Wright had been working at the works laboratory of General Electric Co., Schenectady, since 1902. He made a material contribution to the manufacture and adoption of high-speed cutting steels and produced the material known as Calorite, now almost universally used as resistors in electric furnaces, stoves, etc. During the past two decades he had been concentrating on the improvement of high-temperature and high-strength materials for use in steam turbines.

» «

Leroy F. Johnson, 53, died March 9 at Elmhurst, Ill. He had been Chicago district sales manager of the Vanadium Corp. of America for the past ten years.

"SAF-T" CURTAINS for Welding Plants



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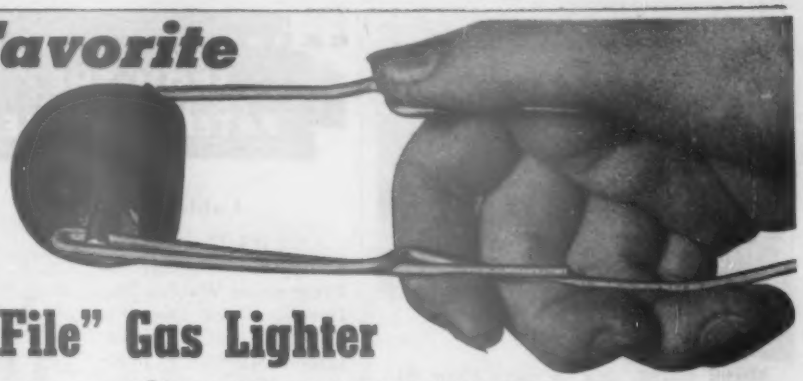

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Send for descriptive circular.

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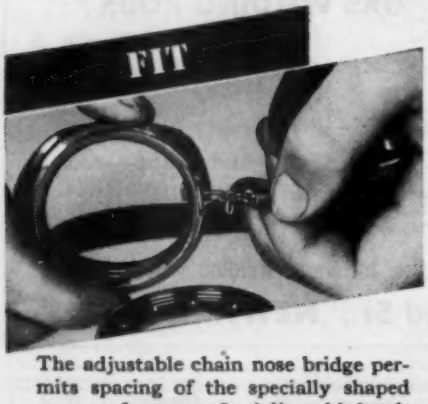

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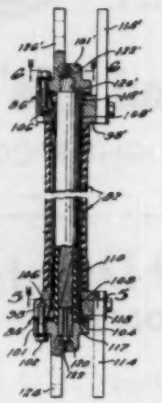
FROM THE PATENT OFFICE

Cable Connector

2,371,185. **Hugo Purat,** Detroit, assigned to **Progressive Welder Co.,** Detroit. Filed Dec. 13, 1940 and Nov. 23, 1942. Issued March 13, 1945.



A cable connector for attachment to an end of electric cable of the type having a pair of telescopically arranged conductors insulated from each other and at least one passageway for passing coolant through the cable. Connector comprises first and second sections. The first section has an opening adapted to receive the outer conductor, to which the section is electrically connected. The outer conductor is wedged between the first section and an annular member received within the aforementioned opening. The second section has an axial recess adapted to receive the inner conductor, to which the section is electrically connected. At least one of these sections has a coolant passage communicating with the coolant passageway in the cable.

» «

Welding Electrode

2,370,100. **Alfred B. White,** Murrysville, Pa., assigned to **Westinghouse Electric & Mfg. Co.,** East Pittsburgh. Filed Dec. 3, 1942. Issued Feb. 20, 1945.

A metal-arc welding electrode having a flux coating extending substantially throughout its length and a semiconductive coating adjacent to the tip only. The latter is comprised of a mixture of conducting material and a binder; binder has a high enough resistivity to produce sufficient heat to produce a rapid ionization that will assist in striking the arc.

» «

Welded Tube Mill

2,370,387. **James L. Anderson,** Closter, N. J., assigned to **Air Reduction Co., Inc.** Filed April 23, 1942. Issued Feb. 27, 1945.

A pipe or tube-welding machine including a means for moving the skelp through the forming apparatus along a given level. A transverse ridge above this level and ahead of the forming apparatus causes the skelp to approach the forming apparatus with a downward slope. The forming apparatus has a pair of opposed rolls, both of which contact with one and the same side of the skelp and perform the initial operation in shaping the skelp to tubular form.

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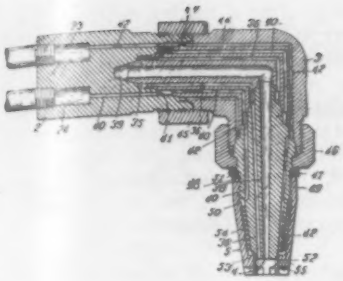


Underwater Cutting Torch

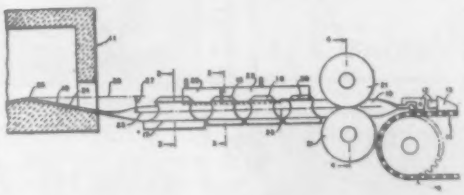
22,610 (reissue). **Andrew Barna,** Chicago. Original No. 2,275,491 issued March 10, 1942. Filed for reissue July 13, 1942. Issued March 6, 1945.

An underwater torch comprising a body having passages therethrough and a head connected to the outlet end and having passages communicating with the passages in the body. A one-piece torch tip is detachably secured to the head; this tip also has a plurality of passages, which communicate with the passages in the head. The passages through the tip include passages for conveying gases to the mouth of the tip and for conveying gases to a point in proximity to the mouth of the tip for maintaining a pilot light and also a passage opening laterally through the side of the tip at a point removed from its mouth. Oxygen is discharged through the lateral passage into a restricted passage formed by a shield about the tip. The shield forms a restricted passage at the mouth of the tip in proximity to the mouth of the pilot-light passage, into which the gases for the pilot light are discharged.

» «

Seam Welder

2,370,485. **Charles A. Nichols,** Anderson, Ind., assigned to **General Motors Corp.,** Detroit. Filed April 9, 1941, and March 6, 1942. Issued Feb. 27, 1945.

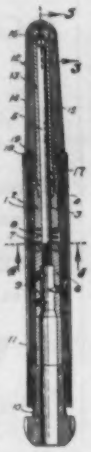


A seam welder for making longitudinal welds on tubing. Rotatable electrode discs, spaced by insulation, together provide a groove for receiving a butt-seam tube to be welded. The transformer is rotatable with the discs; it includes an assembly comprising an annular core with the primary winding and a secondary circuit with one electrode. A drive shaft connected with this electrode extends through the core. A tubular member connected with the other electrode surrounds the drive shaft and extends to the transformer assembly. Drive shaft and tubular member are electrically connected by a means encircling the core and primary assembly. Rings surrounding the core and fixed thereto engage detachable rods extending parallel to the shaft in order to support the core.

» «

Electrode Holder

2,371,003. **Florian Ernest Trinajstich,** Los Angeles. Filed Aug. 28, 1943. Issued March 6, 1945.



An electrode holder comprising a handle structure, a terminal rod, a coarse adjusting means for urging terminal rod outwardly from the handle, a thimble structure covering the protruding end of the terminal rod (and defining a longitudinal bore accommodating the terminal rod and an intersecting transverse bore adapted to receive an electrode), and a fine adjusting means between the thimble structure and the handle. Both of the adjusting means are adapted to move the extremity of the terminal rod into the bore; the coarse adjusting means brings the rod into preliminary engagement with the electrode, and the fine adjusting means forces it into current-carrying contact.

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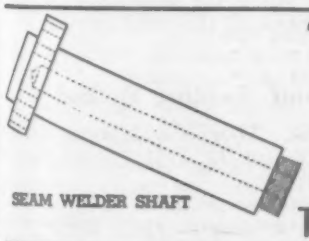
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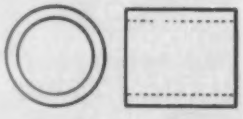
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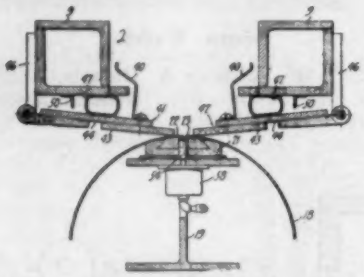
13 Pearl St., Boston, Mass.

Jig for Pipe Welding

2,371,376. **David P. Bisbee,** San Marino, Calif., assigned to **Rheem Mfg. Co.,** Richmond, Calif. Filed Nov. 28, 1941. Issued March 13, 1945.



A side-seam welding stake for a hollow cylinder or the like. A frame provides a horizontally extending welding way open at the upper side. The beam supporting the cylinder has a back-up plate arranged to form the bottom of this welding way and engage the inner side of the cylinder edge portions to be welded. The edge of one of the portions is engaged by abutment members mounted on the back-up plate for alignment; the abutment members are projected or retracted on the plate by a remote control. Independent clamping facilities are provided at each of the opposite sides of the welding way in order to clamp the cylinder portions against the plate for welding.

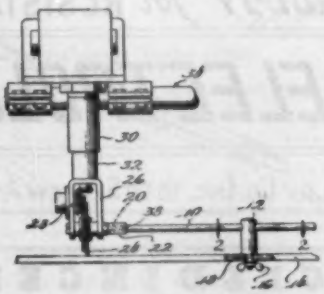
» «

Induction Heater

2,371,066. **Walther Richter,** Whitefish Bay, Wisc., assigned to **A. O. Smith Corp.,** Milwaukee. Filed Dec. 26, 1942. Issued March 6, 1945.

In a low-frequency induction furnace, a substantially fixed outer core structure with an energizing coil and a separate inner core structure adapted to be disposed axially of the tubular article being heated. Inner core structure coöperates with the outer to provide a substantially closed flux path for the furnace. A means is provided for moving the inner core structure longitudinally and for holding it at a selected position relative to the outer core in order to provide a variable gap in the magnetic circuit during the heating cycle.

» «

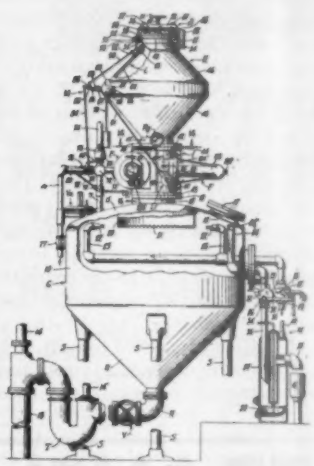


Flame-Cutting Machine

2,371,048. **Stanley W. Hayes,** Richmond, Ind., assigned to **Hayes Track Appliance Co.,** Richmond. Filed Aug. 26, 1942. Issued March 6, 1945.

Flame-cutting apparatus of the type comprising a tracing wheel and a support. The latter includes a threaded shaft extending outwardly. As part of the mechanism for constraining movement of the wheel to a circular path, a radius rod is connected at one end to the threaded shaft and at the other end to a rotatable mounting post. The connection of the rod to the threaded shaft comprises a coupling sleeve receiving the rod relatively loosely and a relatively tight, horizontally disposed pin extending through the rod and sleeve. The rod and tracing wheel may move vertically but not sidewise relative to each other, and the aperture in the post is tapered in opposite directions to permit relative movement between the rod and post.

» «



Acetylene Generator

2,370,630. **Clarence H. Baker** and **Malven L. Olson,** Indianapolis, assigned to **Union Carbide and Carbon Corp.,** Filed Feb. 26, 1941. Issued March 6, 1945.

An acetylene generator comprising a lower generating chamber, an upper carbide hopper having a charging door and an intermediate section. Controls including a pressure-relief valve and the carbide feed are in the intermediate section. The carbide feed is adapted to be locked in a closed position. An interference means is constructed and arranged to permit the charging door to be opened only when the carbide feed is locked in closed position and after excess pressure within the generator has been released through the relief valve.

» «

Butt Welding Method

2,366,978. **Thomas E. Murray,** Brooklyn. Filed July 17, 1941. Issued Jan. 9, 1945.

This patent pertains to the process of resistance welding in which the edge of one pipe is brought into contact with the edge of another, while the pieces are heated to welding temperature, by passing an electric current between them, and then pressed together. The patent covers a method of forming a narrow contacting edge on one pipe and effecting a localized work hardening of this contacting edge so as to render it hard enough to resist cold flattening when the pipes are brought into contact.

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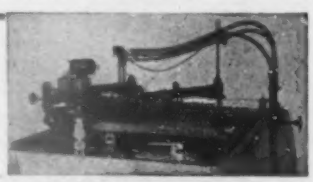

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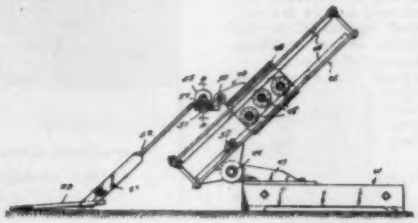
Automatic Welding Apparatus

2,370,716. **Joseph M. Carter,** Baltimore. Filed Dec. 6, 1943. Issued March 6, 1945.

In an apparatus for automatic welding,



an arm for gripping a welding electrode, a support, a track assembly pivotally mounted on the support and adjustable to different inclinations, and a carriage with rollers adapted to travel on the track. There is a transversely adjustable connection between the arm and the carriage.

» «

Magnesium Fluxes

2,370,935. **Charles James Bushrod,** Prestwich, Manchester, England, assigned to **Magnesium Elektron Limited,** London. Filed April 26, 1943 (in Great Britain April 20, 1942). Issued March 6, 1945.

A welding flux for welding magnesium and magnesium-base alloys rich in manganese. It consists of the following compounds in the percentages stated: lithium chloride 21 to 58%, magnesium chloride 3 to 25%, potassium fluoride 14 to 40%, potassium chloride 25 to 65%. These salts together make up at least 78% of the flux. The remainder is compatible with the foregoing ingredients and does not deleteriously affect them.

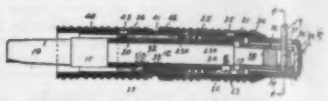
» «

Tube-Welding Unit

2,371,209. **James L. Anderson,** Closter, N. J., assigned to **Air Reduction Co., Inc.,** New York City. Filed Sept. 17, 1940. Issued March 13, 1945.

In a tube-welding machine, a torch holder that positions a torch along the course of travel of the edges of a tube blank, progressively raising the edges to welding temperature. Roll stands through which the tube blank passes include forming rolls and welding rolls, all of which are rotatably supported by a common frame. The frame may be tilted to open all of the roll passes simultaneously for insertion of a pulling tool.

» «



Electrode Holder

2,371,306. **Sam W. Miller,** Portland. Filed May 18, 1943. Issued March 13, 1945.

In an electrode holder, the combination of a pair of telescopic members with openings for the reception of an electrode when the two holes are in register. A spring urges the members to a non-registering position. A cam opposed to the spring may be latched in any of a number of positions for the purpose of obtaining a predetermined compression on the spring.

» «

Electrical Contact

2,371,239. **Franz R. Hensel,** Indianapolis, assigned to **P. R. Mallory & Co., Inc.,** Indianapolis. Filed June 8, 1943. Issued March 13, 1945.

An electric contact formed of an alloy of 0.025 to 2% beryllium and the balance platinum.

» «

Electrical Contact

2,371,240. **Franz R. Hensel,** Kenneth **L. Emmert** and **James W. Wiggs,** Indianapolis, assigned to **P. R. Mallory & Co., Inc.,** Indianapolis.

An electric contact formed of an alloy of 0.5 to 20% of an element selected from the group consisting of cadmium and zinc, 1 to 50% silver and 40 to 98% gold.

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